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NEW ZEALAND AMATEUR RADIO

# CALLBOOK

AND RADIO REFERENCE

There are many NZART Branches throughout New Zealand.

Locations and Branch Numbers are shown – refer to the Branch details inside.

Support NZART and Your Local Branch.



With the kind support of... **kordia**



# Radio Reading Service



**Your  
Invitation  
to  
Listen**

**READING  
by  
RADIO!**

Broadcast from  
Levin

**Founder  
Allen J. Little  
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ZL2GB**

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For more information:

**Phone: (06) 368-2229 Fax: (06) 368-1010**

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NZ Radio For The Print Disabled (Inc)**

**PO Box 360, Levin 5540**

For e-mail, refer to website: [www.radioreading.org.nz](http://www.radioreading.org.nz)

This is a non-commercial, voluntary, Radio Station, established and operated by **New Zealand Radio For the Print Disabled (Inc)**. The station commenced broadcasting on May 9 1987 and is funded from: donations, subscriptions, bequests and limited sponsorship along with assistance from **New Zealand On Air**. Listeners' Comments and Reception Reports are particularly valued by the Station.

*An example of Amateur Radio serving the wider Community*

We read whole  
information as it is  
printed from:

- Newspapers
- Magazines
- Periodicals

## Wellington Mountain Radio Service Inc.

Telephone (04) 564-6929

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— 'CMRS' Field Sets with the full telephone features.

*is the leader in back-country communications.*

**With these 3 field sets..**

**'Help is just a phone call 24/7'**

**MRS3M**

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**MRS1**

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**Central North Island Mountain Radio Service:** Rotorua (07) 345-9687

<http://www.cnimrs.org.nz>

**Collection Points for Radios:**

Rotorua: 24 Iles Road, Rotorua or Courier to your area

**Wellington Mountain Radio Service:** Hutt Valley (04) 564-6929

<http://www.wmrs.org.nz>

Wellington: (04) 479-2144

Otaki: (06) 364-8441

Masterton: (06) 377-0987 or (06) 377-0426

Palmerston North: (06) 356-9450

Wanganui: (06) 345-6624

**Canterbury Mountain Radio Service:** (03) 343-5029

<http://www.mountainradio.co.nz>

**DOC Te Anau & Wanaka (Fiordland & Mt Aspiring National Parks)**

Te Anau: (03) 249-8363

Nelson: (03) 544-7085

Hokitika: (03) 755-6135

Invercargill: (03) 931-1471

Wanaka: (03) 443-7660

Dunedin: (03) 454-3262

*Listen to live traffic on 3345kHz and 3261kHz USB*

Ph/Fax 03 379-7905

Only with the 'Canterbury  
Mountain Radio Service'  
Help is just a phone call 24/7





# NEW ZEALAND AMATEUR RADIO

# CALLBOOK

## AND RADIO REFERENCE

OFFICIAL JOURNAL OF  
THE NEW ZEALAND  
ASSOCIATION OF RADIO  
TRANSMITTERS INC.

# Bi

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NEW ZEALAND AMATEUR RADIO

# CALLBOOK

## AND RADIO REFERENCE

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# THE AMATEUR'S CODE

## **The Radio Amateur is:**

### **CONSIDERATE ...**

never knowingly operates in such a way as to lessen the pleasure of others.

### **LOYAL ...**

offers loyalty, encouragement and support to fellow amateurs, to local clubs and to the New Zealand Association of Radio Transmitters, through which Amateur Radio is represented to Government, to the International Amateur Radio Union and to the International Telecommunication Union.

### **PROGRESSIVE ...**

with knowledge abreast of science, a well-built and efficient station and operation above reproach.

### **FRIENDLY ...**

slow and patient operating when requested; friendly advice and counsel to the beginner; kindly assistance, co-operation and consideration for the interests of others. These are the hallmarks of the amateur spirit.

### **BALANCED ...**

radio is an avocation, never interfering with duties owed to family, job, school or community.

### **PATRIOTIC ...**

station and skill always ready for service to community and country.

*- Based on the original written by Paul M. Segal, W9EEA, in 1928.*



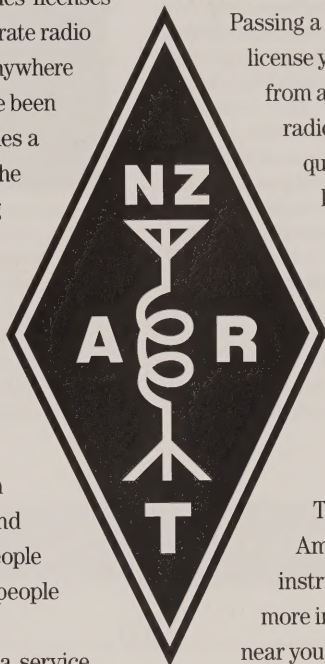
# AMATEUR RADIO

## What is Amateur Radio?

Amateur Radio, also affectionally known as "Ham radio", is a hobby of constructing, experimenting and communicating with radio equipment. In New Zealand, the Ministry of Economic Development (Radio Spectrum Management) issues licenses to Radio Hams. Once licensed, an amateur can operate radio equipment from home, from their vehicles or from anywhere in New Zealand. A number of radio frequencies have been set aside for Amateur Radio. Using these frequencies a Ham can talk across town or around the world. The scope and possibilities are endless – from talking across town to your local repeater to operating in international contests or talking through Amateur Radio satellites.

## Who can be Hams?

Just about anyone can become a Ham. Some famous muscians, actors, kings and prime ministers are Hams, but most are people from all walks of life who like communicating and experimenting with radio and electronics. Young people find Amateur Radio a great training ground, older people find "ham radio" an absorbing retirement hobby. Amateur Radio is more than a hobby, it is also a service. Hams willingly contribute their time, equipment and operating skills whenever the need arises, especially during Civil Defence emergencies and search and rescue operations. The Amateur



Radio Emergency Communicatons (AREC) are a sub group of NZART that organises emergency communications for the Emergency Services.

## How do I become a Ham?

Passing a Ham license is quite easy. For an Amateur Radio license you need to correctly answer 40 out of 60 questions from a multi-choice question paper. The questions cover radio theory and regulations. You can download the questions from the public domain question-bank at <http://www.nzart.org.nz/nzart/exam>. As a newly licensed Ham you will be able to operate on amateur bands below 5MHz or above 25MHz. After three months operation and with 50 logged contacts you will be able to operate on all New Zealand amateur bands.

## Where do I get more information?

The New Zealand Association of Radio Transmitters (Inc.) is a non-profit association of Amateur Radio Operators. NZART has branches and instructors in most of hte larger cities and town. For more information on Amateur Radio and details of a club near you, contact: The Business Manager, NZART, PO Box 40-525, Upper Hutt. Email [nzart@nzart.org.nz](mailto:nzart@nzart.org.nz) or check out the NZART website at <http://www.nzart.org.nz>.

## New Zealand Association of Radio Transmitters

INC  
(Founder Member of the International Amateur Radio Union Region 3)

Mail to: BUSINESS MANAGER, PO BOX 40-525, UPPER HUTT 5140, NEW ZEALAND

PLEASE ENROL ME AS A NEW MEMBER AS FOLLOWS:

TRANSMITTING <input type="checkbox"/>	NON-TRANSMITTING <input type="checkbox"/>	STUDENT <input type="checkbox"/>	FAMILY <input type="checkbox"/>	OVERSEAS <input type="checkbox"/>	ASSOCIATE <input type="checkbox"/>	CONCESSIONARY <input type="checkbox"/>
MR MS MRS MISS	INITIALS	SURNAME				
ADDRESS						
POSTCODE						
OCCUPATION				DATE OF BIRTH		
CALL-SIGN PREFERRED BRANCH, NAME OR NO PLEASE FIND ENCLOSED <b>\$</b> MY SUBSCRIPTION TO <b>Dec 31 2013</b> I agree to abide by the NZART Constitution Signature:						

The information requested (other than date of birth) is for membership records required to be maintained under the Incorporated Societies' Act 1908. Date of Birth is requested for statistical purposes only.

Membership benefits include the automatic inclusion of transmitting call-sign holders' address details in *Call Book* (published annually).

If you DO NOT wish your details published please sign below:

I DO NOT want my address details published by NZART \_\_\_\_\_

IF YOU PREFER TO PAY BY CREDIT CARD PLEASE COMPLETE

VISA <input type="checkbox"/>	MASTER CARD <input type="checkbox"/>	EXPIRY DATE
CARD No.		

Signature: \_\_\_\_\_



## FROM THE EDITOR

This year's Call Book is a full edition and it will be published on a CD later in 2012 when back issues of *Break-In* and the WIA Call Book are available in an electronic format for inclusion on the CD. Thanks to all those who have given their time to contribute to the content of this publication.

This is the first time in several years that the New Zealand Ministry of Business, Innovation and Employment; Technology and Communications Group which includes Radio Spectrum Management (RSM) has been able to provide access to download the *call-sign* database as it is in the Spectrum Management and Registration Technology (SMART) online database. RSM have spent much time and effort removing Silent Keys that have been advised to them with appropriate documentation and also have emailed or sent letters to all holders of *call-signs* in the database. If your *call-sign* is not shown in this Call Book, the first thing to do is check if it is in SMART online at <<http://www.rsm.govt.nz/smart-web/smart/page/-smart/WelcomePage.wdk>>. If the name beside the *call-sign* is "RSM Reserved" it means that RSM did not receive a reply from the *call-sign* holder at the listed address. If this applies to you, contact RSM by



email to <[rsmlicensing@med.govt.nz](mailto:rsmlicensing@med.govt.nz)> or telephone at 0508 776 4636 as soon as possible to ensure your *call-sign* is not lost.

73

de Lorne Douglas ZL2AHB / ZL3LSD

## CHANGE OF ADDRESS NOTIFICATION

To

The Business Manager, NZART  
PO Box 40-525, Upper Hutt 5140

Name \_\_\_\_\_ Call-sign \_\_\_\_\_ Membership No. \_\_\_\_\_

Old Address

New Station Address:

\_\_\_\_\_  
\_\_\_\_\_

\_\_\_\_\_  
Postcode \_\_\_\_\_

**Break-In postal address (if different):**

\_\_\_\_\_  
\_\_\_\_\_

\_\_\_\_\_  
Postcode \_\_\_\_\_



**REMEMBER:** if you change your address you **MUST** notify the  
Ministry of Economic Development (Radio Spectrum Management) 0508 776-463  
**AND** the Business Manager, NZART.

**PLEASE POST THIS FORM TO THE BUSINESS MANAGER, NZART AT THE ABOVE ADDRESS.**





# NZART MEMBERSHIP SERVICES

**Liaison with the Ministry of Economic Development, Radio Spectrum Management group;** for regulatory and radio spectrum matters and for the protection of the Amateur Service.

**International Representation:** the New Zealand amateur radio society and the New Zealand member society of the International Amateur Radio Union.

**A National Headquarters:** the focal point in New Zealand for Amateur Radio, enquiries and activities.

**Public Service Involvement:** by the Amateur Radio Emergency Communications (AREC) for Civil Defence, Search and Rescue, with related activities and training.

**Amateur Repeater Service:** co-ordination by the Frequency Management and Technical

Advisory Group.

**Amateur Beacon Service:** co-ordination by the Frequency Management and Technical Advisory Group.

**Spectrum Band-planning:** co-ordination by the Frequency Management and Technical Advisory Group.

**Technical Standards and Policies:** co-ordination as required.

**Monitoring System:** to exercise continuing active protection for our radio frequency bands.

**Satellite Co-ordination:** liaison with amateur satellite organisations worldwide.

**Satellite Support:** donations and fundraising as required.

**Headquarters Infoline:** on-line frequently and direct to your mailbox with up-to-date information and news releases.

**Official Broadcast:** transmitted monthly.

**Official Journal Break-In:** published two-monthly, New Zealand Amateur Radio's continuing record.

**Amateur Radio Call-Book:** published annually.

**NZART Website:** [www.nzart.org.nz](http://www.nzart.org.nz) for up-to-date information with past reference and activity records.

**Annual Conference:** our national forum.

**VHF Convention:** two-yearly, organised by enthusiasts, constructors and experimenters.

**Education and Development Group:** for promotion of Radio Training.

**Examination Division:** for Amateur Operator Certificates, *call-signs* and qualifications.

**Reciprocal Qualifications:** advice for travellers to or from New Zealand.

**Third Party Insurance:** for NZART activities, branches and AREC.

**QSL Bureau:** for dispatch and collection of QSL cards.

**Contests and Awards:** administration, branch, national and international.

**Video Tape Library:** for branch borrowing.

**Morse Practice:** arranged as required.

**A selection of sale items from HQ:** with member discounts.

**Special Projects from time-to-time:** such as funds for promoting radio in developing countries.

**ZL6A Headquarters Station:** of the New Zealand Association of Radio Transmitters.

## NZART MEMBERS ORDER FORM

NZART Publications and Supplies	Price each	Non Member	Quantity required	Cost
Additional copies of <i>Break-In</i>	\$6.00	\$10.00		
Amateur Radio Logbook	\$10.00	\$12.50		
Amateur Radio Training Manual Fifth Edition (spiral bound)	\$30.00	\$40.00		
<i>Call Book</i> 2012-2013	\$25.00	\$35.00		
<b><i>Ham Shacks, Brass Pounders and Rag Chewers</i></b>	<b>\$5.00</b>	<b>\$20.00</b>		
Log Sheets (per 10)	\$2.00	\$5.00		
Secret Listening	\$5.00	\$10.00		
NZART Examination Questions (bound copy)	\$20.00	\$25.00		
<b><i>Examination DVD – Set of 13</i></b>	<b>\$50.00</b>	<b>\$50.00</b>		
NZART Badge – <i>Call-sign</i>	\$9.30	N/A		
– Life Member of Branch	\$13.60	N/A		
– OTC Blue	\$9.70	N/A		
– Plain	\$3.70	N/A		
NZART Pen	\$2.00	\$4.00		
Plastic coated name badge	\$10.50	N/A		
<b>NZART Subscription:</b> Transmitting/Family/Overseas/Student T = \$99 / F = \$129 / O = \$115 (air) / O = \$100 (surface) / Student \$45				
<b>TOTAL \$</b>				

Prices include GST plus P&P and are subject to change without notice. Please include full remittance with order. Non-members add 20% to all prices. Overseas members will incur additional postage dependent on country.

**Examination Application Fee \$5.00 (administration costs to Branch)**

**New/Lapsed Call-sign and Certificate of Competency \$95.00\***

**Secondary Call-sign \$50.00**

**One Letter Call-sign \$50.00**

**Change of Call-sign \$50.00**

**Replacement Certificate \$25.00**

\* Receive one year free membership to NZART from 1 January until 31 December in the same year. If joining after 1 October, membership will expire 31 December the following year.



# NZART INFORMATION

NZART Address: Suite 9 19 Main Street Upper Hutt. P O Box 40 525 Upper Hutt 5140.  
Ph: 04 939 2189, Fax: 04 939 2190  
Office Hours: 9am – 2.00pm Tuesday to Friday

## COUNCIL

### President

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### Vice President

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Phil King ZL1PK      zllpk@xtra.co.nz

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John Andrews ZL2HD      jandrews@clear.net.nz

Fred Johnson ZL2AMJ      fredj@clear.net.nz

### Councillors Midlands District

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Stuart Watchman ZL2TW      clareandstuart@xtra.co.nz

### Councillor Southern District

Terry Thomas ZLATAE      terry@teradio.co.nz

## OFFICERS

### Treasurer

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E-mail: <ALO@nzart.org.nz>

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E-mail: <arec@nzart.org.nz>

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Phone: 06 370 1245

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E-mail: <awards@nzart.org.nz>

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Phone: 03 981 9720

### Contest Manager

Frank Hunt ZL2BR

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8 Manu Crescent, New Plymouth 4310

Phone: 06 753 5604

### E M C Officer

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Debby Morgan ZL2DL

E-mail: <exam@nzart.org.nz>

NZART, C/- P O Box 40 525,

Upper Hutt 5140

### FMTAG

*Chairman:* David Andrews ZL2SX

*Secretary:* Doug Ingham ZL2TAR

*Frequency Co-ordinator:* Doug

Ingham ZL2TAR

PO Box 40-525 Upper Hutt 5140

Email: <fmtag@nzart.org.nz>

### Local Government Liaison Officer

Mike Newman; MD ZL1BNB

E-mail: <localgovt@nzart.org.nz>

Address: 30 Nikau Street, Wanganui 4501

Phone: 06 344 6830

### Monitoring Service Co-ordinator

John Martin ZL1GWE

E-mail: <MS@nzart.org.nz>

57 Crescent Road East, Palm Beach,

Waiheke Island 1081

### Overseas IARU Liaison Officers

John Lochhead ZL4QS

E-mail: <iaru@nzart.org.nz>

### Reciprocal Licensing Bureau Manager

Joe Reed ZL2AH

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Address: 7A Humphrey Street,

Marton 4710

Phone: 06 327 7003

### Region 3 Officers in NZART

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E-mail: <peter.lake@xtra.co.nz>

### QSL Bureau Manager

Barry Stewart ZL2RR

E-mail: <qsl@nzart.org.nz>

P O Box 857, Wanganui 4540

### VHF/UHF/SHF Records Co-ordinator

Vacant

### NZART Web Master

Alan Wallace ZL1AMW

E-mail: <webmaster@nzart.org.nz>

### NON-IONISING RADIATION STANDARDS

Dr. David Black ZL1MZ

E-mail: <zllmz@nzart.org.nz>

P O Box 6, Waiuku 2341

## NZART's PRIORITIES:

The interests of its TRANSMITTING MEMBERS, and, the access by RADIO AMATEURS to bands throughout the RADIO FREQUENCY SPECTRUM, by membership and active support of the INTERNATIONAL AMATEUR RADIO UNION.



# NZART Headquarters

Visitors welcome.  
Hours 9am – 2.00pm Tuesday-Friday  
Suite 9, 19 Main Street, Upper Hutt

## Business Manager

Debby Morgan ZL2DL  
Phone: 04 939 2189  
Fax: 04 939 2190  
Email: <nzart@nzart.org.nz>  
Postal: P.O. Box 40-525, Upper Hutt 5140

# NZART Subscriptions 2012/13

T Transmitting	\$99.00
A Associate	\$99.00
B Branch	\$99.00
N Non-Transmitting	\$99.00
F Family Transmitting	\$129.00
G Family Non-Transmitting	\$30.00
S Student	\$45.00
O Overseas (No GST)	\$100.00
O Overseas Airmail	\$115.00

## Break-In Editor:

J. R. L. Walker ZL3IB  
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Association of Radio Transmitters (Inc.)  
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Break-In  
PO Box 1733  
Christchurch 8015

## CHANGE OF ADDRESS or DELIVERY PROBLEMS

Advise the Business Manager  
PO Box 40-525, Upper Hutt 5140

## Official Broadcast

J. A. Meachen ZL2BHF  
E-mail: <zl6a@nzart.org.nz>  
The monthly NZART Official Broadcast is made by ZL6A, AUCKLAND 3900kHz LSB on the last Sunday of each month except December, when the broadcast is made on the Sunday before Christmas. There is no broadcast in January. The broadcast is also made on the National System and some VHF repeaters. The time of the broadcast is 2000 hours. A repeat broadcast is made at 2100 hours. Members and Branches are welcome to submit material to ZL2BHF, C/- NZART Headquarters, PO Box 40-525, Upper Hutt 5140 for inclusion in the broadcasts.

## Conference Official Broadcast

The Official Conference Broadcast is held on the Sunday of Queen's Birthday Weekend at 2000 hours.

# PRESIDENTS

1926-1927	E A Shrimpton	Z2XA	1953-1955	R H Hanley	ZL2GU
1928	R J Orbell	OZ1AX	1955-1958	H F Arnold	ZL3HA
1929	R J Orbell	ZL1AX	1958-1960	J F Freeman	ZL1VA
1930	T R Clarkson	ZL1FQ	1960-1962	G M Salt	ZL1CK
1931	H P V Brown	ZL3CG	1962-1964	R T Woodfield	ZL2VN
1932	D Wilkinson	ZL2AB	1964-1966	C G Liddell	ZL3ND
1933	N W Laugesen	ZL3AS	1966-1969	H Burton	ZL2APC
1934	W G Collett	ZL4BP	1969-1970	W R Hamer	ZL2CD
1935	C N Edwards	ZL1AA	1970-1972	D A Lloyd	ZL4PG
1936	W M Hall	ZL2BF	1972-1973	D E Cleland	ZL1IY
1937	R B Dodds	ZL4FK	1973-1974	J F C Johnson	ZL2AMJ
1938	L G Petrie	ZL2OV	1974-1977	W D Gorman	ZL2IY
1939	F W Sellens	ZL2MY	1977-1983	A G Godfrey	ZL1HV
1940	B E Jackson	ZL2FJ	1983-1985	D J Mckay	ZL3RW
1941-1942	W Fouhy	ZL2LB	1985-1991	T D Carrell	ZL3QL
1943-1944	C G Liddell	ZL2BI	1991-1992	T C King	ZL2AKW
1945-1946	E B Lough	ZL2OG	1992-1997	J A Meachen	ZL2BHF
1947-1949	C G Liddell	ZL2BI	1997-2001	A J Wallace	ZL1AMW
1949-1950	J F Freeman	ZL2AFB	2001-2005	A P Norden	ZL2SJ
1950-1951	C T Berry	ZL2BY	2005-2009	W L B Douglas	ZL2WP
1951-1953	W J Wainwright	ZL3LI	2009-2012	D R Symon	ZL2KH
			2012-	V Hendersen	ZL1TGC

# HONORARY LIFE MEMBERS

1934*	N W Laugensen	ZL3AS	1980*	F R W Andrews	ZL2IJ
1943*	F W Sellens	ZL2MY	1982	G C Blackwell	ZL3NT
1946*	W Fouhy	ZL2LB	1983*	A G Godfrey	ZL1HV
1947*	W D Gorman	ZL2IY	1985	J F C Johnson	ZL2AMJ
1948*	J F Freeman	ZL2AFB	1986*	C W Parton	ZL3CP
1948*	G McB. Salt	ZL1CK	1987*	D Wilkinson	ZL2AB
1948*	T R Clarkson	ZL2AZ	1989*	R S H Morgan	ZL2GQ
1949*	A F Leader		1990*	G A Kilpatrick	ZL1BBS
1950*	W M Hall	ZL2BH	1992*	D J MacKay	ZL3RW
1950*	Mrs W Hall		1992	R L Baldwin	W1RU
1953*	R Cassey	ZL2IQ	1996	R W G Kingston	ZL4MK
1954*	J G Howard	ZL4FR	1998*	R N Copeland	ZL2AKV
1961*	J M White	ZL2GX	2000	J A Meachen	ZL2BHF
1964*	H F Arnold	ZL3HA	2000	T D Carrell	ZL3QL
1966*	C G Liddell	ZL3ND	2002	G E Bold	ZL1AN
1972*	M R O Montgomery		2004	R E Knowles	ZL1BAD
1975*	A R Harris	ZL4CA	2005*	J C Pye	ZL2NN
			2009	D V Andrews	ZL2SX
			2011	J D Ingham	ZL2TAR

*\*Denotes deceased*



# NZART EXAMINATION SUPERVISORS

Effective 11 July 2012

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<b>Morse:</b>		
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## NZART Radio Science Education Trust

### Application for Grant-in-Aid

Applications are invited from secondary school science teachers and other training providers for Grants-in-Aid from the NZART Radioscience Education Trust to promote the development of projects in the general areas of radio and/or electronics. It is anticipated that these projects will lead to entries in the local area Science and Technology Fair. Grants will not normally exceed \$250.00

Applications should normally be received no later than 30th April of the year of application. Application forms may be obtained from:

The Trustees,  
NZART Radioscience Education Trust,  
PO Box 1733,  
Christchurch 8140,  
or from <trustee@nzart.org.nz>. Applications should be endorsed by the Head of Science or, for other organisations, the President/Chairperson.

## "DX" WITHOUT "TX"

For over 60 years, the NZRDXL has catered for the interests of DX listeners in New Zealand.

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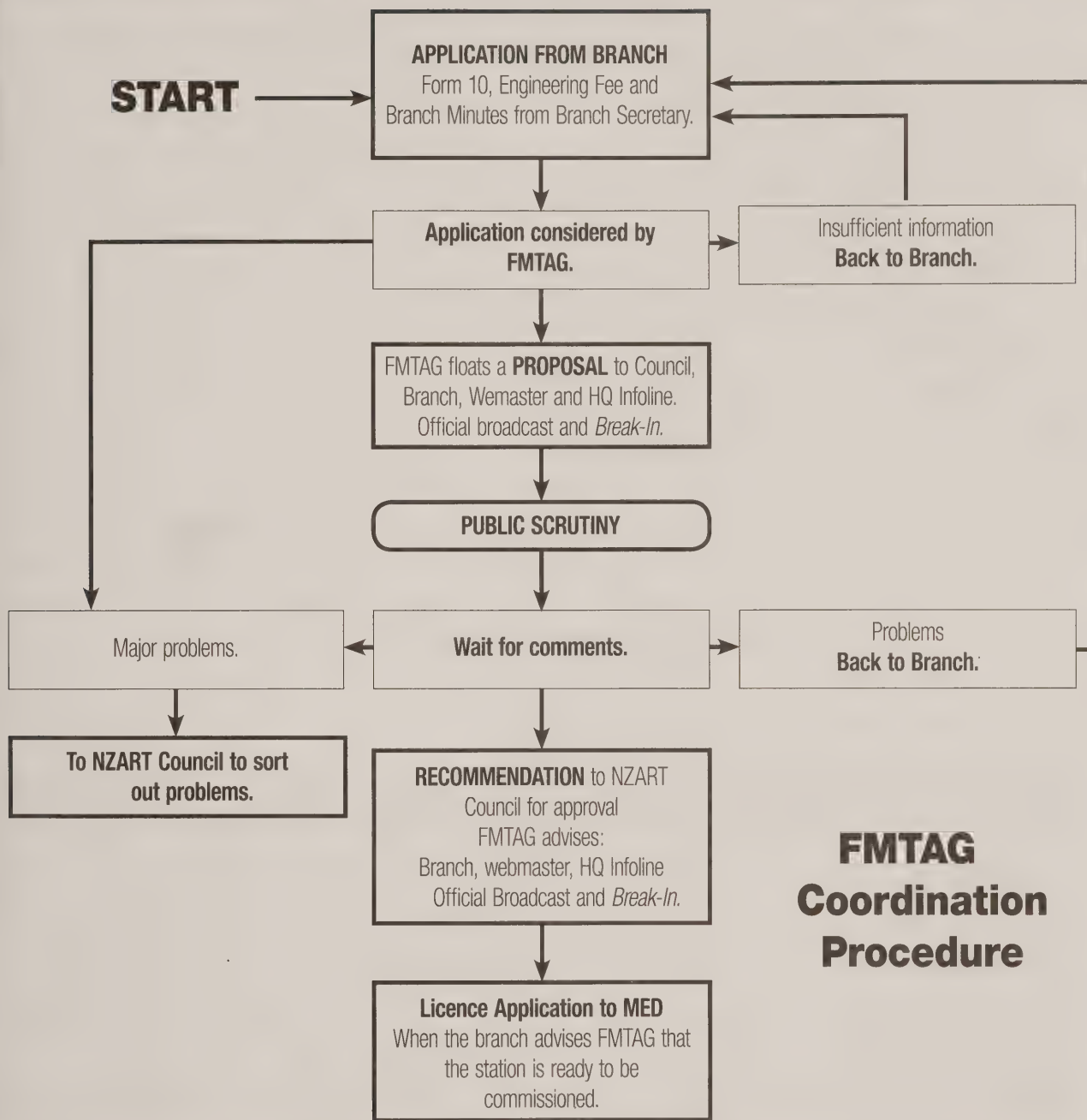
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NZRDXL, PO Box 39-956, Howick, Manukau



# FMTAG PROCEDURE



## FMTAG Coordination Procedure

### FREQUENCY MANAGEMENT TECHNICAL ADVISORY GROUP (FMTAG)

FMTAG consists of: Chairperson, Secretary and others as appointed by NZART Council. The purpose and actions of the FMTAG are:

- Study and report to Council on matters affecting amateur radio frequencies.
- Plan future use of amateur bands
- Select frequencies for Amateur Fixed Stations

- Maintain a register of Amateur Fixed Stations
- Assists in preparing drafts for Council including submissions when needed, to the Ministry of Economic Development (Radio Spectrum Division) on behalf of the Amateur Service prior to each major ITU meeting or conference
- Band plans are developed by the FMTAG based on IARU

recommendations, local requirements, and submitted to NZART Council for approval. Application Forms for repeaters and beacons can be obtained from a NZART Councillor, NZART HQ or email your request to <fntag@nzart.org.nz>.

Prepared by FMTAG MAY 2000





# REPEATER/BEACON/LINK etc NZART FORM 10

(revised: 2011-02-01)

Please fill in the details and send by email to: [fntag@nzart.org.nz](mailto:fntag@nzart.org.nz)

Application date:

Originating Branch name and number

Trustees (two required)

**Trustee 1** (also the nominated MED contact person)

Name:

Callsign:

NZART membership number (on *Break-In* wrapper):

Phone number:

Email address:

**Trustee 2**

Name:

Callsign:

NZART membership number (on *Break-In* wrapper):

Phone number:

Email address:

Location in Topo50 Grid coordinates:

MED site name, or name on Topo50 map:

Site ground height on Topo50 map:

Desired name of station in Call Book:

Owner of site:

Owner of building housing station:

Type of station: Amateur H

Voice repeater (Y/N):

Digipeater (Y/N):

Data repeater (Y/N):

ATV Repeater (Y/N):

National System repeater (Y/N):

STSP repeater (Y/N):

Beacon (Y/N):

Beacon call-sign requested:

Other (give details):

Band for this station:

Receive location: Amateur Mobile Area

Antenna configuration:

Antenna polarisation:

Antenna gain (dB isotropic):

Antenna height above ground (m):

Distances to other nearby antennas (m):

Direction(s) of maximum radiation (degrees true), or omni:

Feeder loss (dB) or feeder type and length:



Transmit circulator make and model number:

Transmit Duplexer or Output Filter make and model number:

Transmit Duplexer or Output Filter loss (dB):

Transmit modulation mode:

Receive Duplexer or Input Filter make and model number:

Receive Duplexer or Input Filter loss (dB):

Receive modulation mode:

Make of Tx:

Model of Tx

Make of Rx:

Model of Rx:

Transmitter output power (W):

dBW

EIRP:

dBW

Main Power source Mains (Y/N):

Solar (Y/N):

Other (Y/N):

Backup power source (Y/N)

Copy of minutes of Branch meeting approving construction:

Comments and/or System diagram/description:

Details checked by MED-Approved Radio Certifier/Engineer number:

*Please make payment of \$50 to NZART HQ, by cheque or to BNZ Upper Hutt: 02 0772 0209760 00  
Please email FMTAG when payment has been made: fmtag@nzart.org.nz*

NOTES AND HINTS ON COMPLETING NZART FORM 10

The aforementioned version of NZART Form 10 replaces all others. Please do not use old versions. The changes since the last version were necessary to obtain the extra information required by the certifying engineer and the MED Licensing Section.

**Permanent location, from InfoMap 260 series map.**

The MED requires the station location to better than 100 metres accuracy. This corresponds to 2 mm on the NZ260 series map. Please ensure that any GPS unit is set to the "NZ 1949" geodetic datum option. Please see page 13 of Jan/Feb 2001 Break-In for more details. In the case of Short Term Special Purpose (STSP) repeaters, please enter the storage location.

**"Suppressed Records" Government radio services.**

The licence details of some Government radio services, such as Police, do not appear in the

public licence records. The MED has special licensing procedures for sites that have such services. It is helpful, and minimises delay in obtaining licences, if FMTAG is advised by the applicant, if the site is shared by, or is near to a site occupied by, a Government radio service. If possible, please identify the Government Department involved.

**Antenna gain (dB isotropic).**

The MED requires the (dB isotropic) antenna gain to better than 1 dB accuracy. There are two references for gain: dB isotropic (dBi) and dB dipole (dBd). There is 2.1 dB difference between these two references. FMTAG will work out the (dB isotropic) gain, if it is not known, from your description of the antenna.

**Distances to other nearby antennas (m) and other technical details.**

The MED requires FMTAG to calculate the likely levels of intermodulation from the inter-

station coupling. This factor includes the inter-antenna coupling, between the antennas of the existing stations and the antenna of the proposed station, and the off-frequency attenuation of the filters, duplexers, circulators, feeder loss, etc. FMTAG can calculate the inter-station coupling from the relative orientation and distance between antennas, and the make and model of the other equipment. Please ignore all antennas more than 10 wavelengths away, for example, more than 20 metres away at the 2-metre band. Please include all antennas for the other stations operating on frequencies between half and twice the frequency of the proposed station, for example, all antennas between 72 MHz and 296 MHz for a 2 metre station. However, please include all Amateur antennas, because of the harmonic relationship between most of the Amateur bands. The relative antenna orientation also affects the inter-antenna coupling. A simple sketch would be useful.

**Make and model number.**

Home made equipment is acceptable to the MED. Please put "Amateur" followed by the surname of the constructor, in the applicable space. However, for the protection of the Repeater Trustees, the equipment should be tested to ETS 300684, prior to being turned on. ETS 300684 is about 10 dB stricter than RFS25, for FM voice transmitters, and 10 dB stricter than RB16, for ATV transmitters. The MED requires unwanted emissions outside the Amateur bands to comply with ETS 300684. The level of unwanted emissions is also determined by the inter-station coupling. The MED has the right to require that unwanted emissions are suppressed to a greater extent than required by ETS 300684, and to turn off a station until the necessary measures, such as additional filters or circulators, are taken to achieve this.



## Video Tape Library

Cost of hire for each video is \$10.00 including P & P.

- 1) **All China RDF Competition**  
A serious 30-minute look at Amateur Radio Direction Finding – an official sport in China.
- 2) **The Happy Flyers Techniques of RDF**  
A 26-minute audio-visual presentation of the theory and techniques for VHF Radio Direction Finding.
- 3) **The Aerial Circus with Dud Charman G6CJ**  
45 minutes. Verification of the theory of the operations of a variety of VHF and HF antennas. See the theory confirmed by means of scale model antennas.
- 4) **Amateur Radio's Newest Frontier**  
30 minutes. A recent production from ARRL. Looks at the Radio Amateurs' involvement in space.
- 5) **NAREC 50**  
A 60-minute production by Branch 25. Looks at the Napier Conference and the 50th Anniversary of AREC.
- 6) **Communications – The Hidden Revolution**  
135 minutes. An address and demonstration by the Engineer-in-Chief, New Zealand Post Office, on modern communications techniques and methods.
- 7) **The Integration and Launch of AMSAT OSCAR-10**  
35 minutes. A preview of the presentation and launch of OSCAR-10 by Werner Haus ZJ4KQ.
- 8) **The Wonderful Wide World of Amateur Radio**  
27 minutes. Produced by JARL. A look at Amateur Radio in Japan.
- 9) **W. (Bill) Orr W6SAI Whakatane Conference Opening June 1988**  
20 minutes.
- 10) **1987 Dayton Hamvention – A KGØP Production**  
30 minutes.
- 11) **ARRL's New World of Amateur Radio 1988**  
Via WA6AI.
- 12) **W6AI Sunday 05/06/1988**  
Lecture on Linear Amplifiers.
- 13) **Component Identification – ZL1TOF**  
18 minutes.
- 14) **Launch of Ariane IV 15/06/1988**
- 15) **RSGB's Amateur Radio for Beginners**  
43 minutes.
- 16) **Waiting for the Big One**
- 17) **Fuji-2 JAS-1**  
Japanese Amateur Satellite 1B.
- 18) **Ham Radio In Space**  
30 minutes. ARRL.
- 19) **SAREX – Shuttle Amateur Radio Experiment**  
19 minutes. ARRL.
- 20) **"More Than Radios" from Zman Productions**  
This video is a very special message to Amateur Radio Operators. It is a strong emotional video and not like any other video you have seen about Amateur Radio.

- 21) **Getting Started in Packet Radio**  
From CQ Communications Inc. This video will help demystify the exciting but sometimes confusing world of Packet Radio.
- 22) **Dayton Hamvention 1966**  
Vaughan Henderson ZLITGC.
- 23) **DXpedition May 1996 to Raoul Island – ZL8RI**
- 24) **What's Happening in ARDF**  
7 minutes.
- 25) **ZL3CI – Campbell Island 1999 – James Brookes 9V1YC** 60 minutes. Further copies of this can be purchased \$US25.00 plus P & P through <http://www.dxvideos.com/>.
- 26) **An Interview with Gerald Beattie – June 21, 1989**  
28 minutes.
- 27) **NZART Amateur Television Official Broadcast March 30, 1986**
- 28) **NZART 75th Anniversary Conference Auckland 2001**
- 29) **Commemoration at Musick Point 2003**
- 30) **ZL2AMJ Investiture at Government House August 2002**
- 31) **The Secret Wireless War (new)**  
120 minutes. Beyond Bletchley Park and Black Propaganda

## CD-ROMS for Hire

Costs for hire of each CD-ROM is \$10.00 including P & P.

- 1) **Bell-Goyder QSO October 18, 1924**
- 2) **513A IOTA Yambe Island DXpedition, July 1-10, 2000**
- 3) **NZART 75th Anniversary Conference**
- 4) **Otago Branch History (1923–2003) 75th**
- 5) **NZ WARO History (1962–2002)**
- 6) **The Story of Enigma**  
A webpage display (html and jpg files). Not recommended for Branch entertainment by projection.

## ARRL Ham Software Library

- 1) **Ham Radio CD Rom 1968–1976**
- 2) **Ham Radio CD Rom 1977–1983**
- 3) **Ham Radio CD Rom 1984–1990**
- 4) **Tune in the Universe—Paul Shuch N6TX**
- 5) **Ham Shack Brass Pounders & Rag Chewers on CD**
- 6) **NZART Convention 2006 Radio Astronomy**  
by Clive Rowe
- 7) **NZART Convention 2006 Time & Frequency**  
by Dave Brown ZL3FJ
- 8) **NZART Convention 2006 How Sound Card Digital Modes Work** by ZL1BPU



# NZART

*Devoted to AMATEUR RADIO since 1926*



# BRANCHES AND MEMBERSHIP

A Policy Statement by Council (Revised 1996, second revision June 2005)

Members will be aware of the requirement in paragraph 7.3 of the Association Constitution that Branches must not admit to membership persons who hold an amateur station licence, but who are not members of the Association.

Over the years there have been attempts to repeal or modify these provisions, but successive National Conferences have made it quite clear that members will have none of it. The rationale for this Constitutional provision is that it provides at least one way in which non-members can be denied the privileges which membership of the Association brings. We cannot stop our non-member brethren enjoying some benefits – such as the negotiations the Association conducts with the licensing authorities, the use of repeaters, and the enjoyment of the benefits of which bandplans bring. Council is firmly of the view that it is unfair to those that do pay their subscriptions if the lot of non-members is made easier by the ready availability of member's privileges which the Association is, in fact, able to withhold. Further, the Association has to take into account the feelings of its many voluntary workers, who devote many hours to Association matters, and, in addition, pay their subscriptions as well. These persons have even greater cause to complain if the Association makes benefits available to non-members who do not contribute to these benefits by at least joining the Association and paying a subscription.

## Branch Officers

It is disturbing to Council to find that some Branches not only fail to have regard to their Constitutional obligations by ensuring that licensed amateurs who are not Association members do not join the Branch. Some Branches also have as Branch Officers persons who are licensed amateurs but not members of the Association. This is clearly unconstitutional. If an Officer is not an Association member, but is a licensed amateur, then there is a breach of the Association Constitution. This

should also be a breach of the Branch Constitution - if it is not, the Branch Constitution is faulty and must be brought into line. (See the Association's Constitution – paragraph 7.3(c).)

Regrettably there are one or two branches that indulge in this fiction. The Branch attempts to evade its responsibilities to NZART, whether arising under paragraph 7.3 or otherwise, by purporting to distinguish between the local club and the NZART branch. This fiction ignores the realities, and is not acceptable. The reality is that the local club itself is the NZART branch, and the branch constitution must be changed to reflect this commitment to NZART if that is necessary. Any attempt (for that is all that it is) to circumvent the Association Constitution by resorting to this fiction is unfair to the local NZART members, other NZART members, and the Association itself.

## Relationship between Branches and the Association

Sometimes, Branch members criticise these rules, often using catch phrases such as “breach of human rights”, or “interference with independent clubs”. These provisions of the Association Constitution are nothing of the sort. They are part of the contract that members make when they join the Association. By applying to become or by remaining an Association Branch, the Clubs or Branches surrender their independence to the extent required to conform to the Association's Constitution. Branches are expected to keep their houses in order; if they are not prepared to do this, then they should prepare to surrender their status as a Branch. There is nothing in the Human Rights Act to prevent the Association and its branches from discriminating between members and non-members.

## Whose job is it to be the policeman?

The answer is – nobody's and everybody's. The Association's

Constitution does not specifically charge Council or any Officer with the task of enforcement. So long as we remain members, we are all parties to the contract represented by the constitution and we each individually have that responsibility. If a Branch is incorporated in its own right, then the branch in its corporate capacity also has that duty.

## Hardship

Hardship is not a ground for failing to become an Association member. Association subscriptions can be remitted under paragraph 5.1(f) of the Association Constitution and Council will authorise this where there is genuine hardship. But Council's experience has been that the genuine hardship is rare indeed. Many claims of hardship over the years have been found not to be genuine. The member should initially make application to the General Secretary for this concession. If considered necessary Council might then discretely seek further information from the Branch. Council expects that there would be very few cases in the country at any one time. The privacy of the applicant is respected by ensuring that as few persons as possible within the Association are aware of the application.

In cases of hardship, subscriptions may be paid by monthly automatic payment. The applicant should discuss this option with the General Secretary.

## Why are we telling you this now?

Council has never said anything else. But there are now some situations that create special problems for the Association.

The Association enters into contracts with private landowners, public corporations and State Owned Enterprises relating to right of entry to land for the siting of repeaters. These contracts recognise potential liabilities and require the Association as a condition of the contract to take public liability insurance, which could be up to \$2,000,000 or more. This insurance will be

taken on terms that will extend to protect both the Association and individual members. Naturally, the corporations we are dealing with take comfort in this insurance, as they know that while the insurance is in place the Association has the indemnities required to meet any claims. The reality is that to come within the Association's cover, individuals must be members. The Association has no intention of paying additional premiums to insure against the actions of non-members. If an individual incurs liability as agent of the Association, then that individual must be a member to take the benefit of any cover the Association arranges. The Association will not appoint non-members as its agents, as this would nullify the insurance cover. As branches have responsibility with the Association for repeaters, Branch Officers are required to be Association members. This is no more than the Constitutional requirement. Because of these matters, Council will, in future, have to be more active in seeing that the Constitution is observed. As the appointment of repeater trustees is an Association matter, even if exercised through Branches, repeater trustees must also be members. This, likewise, is a necessary consequence of the provisions of the Constitution. Council, in future, will have to ensure that repeater trustees are Association members, not only because this is a Constitutional requirement, but also to ensure that the persons responsible for the operation of repeaters have adequate insurance cover to meet the requirements of our contracts with the public corporations.

## Action

Take action now to ensure that your Branch complies with the Association Constitution. Your Councillor will help you with advice as required.

This policy statement was first published in the August 1990 Break-In. It is now reissued in a slightly revised form.

NZART Council February 1996  
Second revision ZLIUD, ZL1DD, ZL2BHF June 20 2005

## The Constitution of the New Zealand Association of Radio Transmitters Incorporated

is available from: The Business Manager, NZART, Freepost 3565, PO Box 40-525, Upper Hutt 5140  
or NZART URL: <http://www.nzart.org.nz/nzart> [nzart@nzart.org.nz](mailto:nzart@nzart.org.nz)



# NZART BRANCH DIRECTORY

## Alphabetical List of Branches

<i>Date of update</i>	<i>Date of update</i>	<i>Date of update</i>	<i>Date of update</i>
01 M Ashburton 2012	16 C Horowhenua 2012	29 N North Shore 2012	60 N Taupo 2012
02 N Auckland 2012	79 N <i>Howick &amp; Districts</i>	52 C <i>Northern Hawkes Bay</i>	39 N Tauranga Districts 2012
66 N Auckland VHF Group 2012	17 N Huntly 2012	73 N <i>Northern Wairoa</i>	88 N Tauranga ECG 2012
84 N Bay of Islands 2012	18 C Hutt Valley 2012	72 N Opotiki 2012	77 N <i>Te Aroha &amp; Districts</i>
04 N Cambridge 2012	19 C <i>Inglewood</i>	30 S Otago 2012	40 N Te Awamutu 2012
* M Canterbury (CARDS) 2012	76 M <i>Kaikoura</i>	31 C <i>Pahiatua</i>	53 N Te Puke 2012
15 C <i>Central Hawkes Bay</i>	69 C Kapiti 2012	65 N Papakura 2012	41 N Thames 2012
61 S Central Otago 2012	67 N Kawerau 2012	54 C <i>Patea</i>	42 C Titahi Bay 2012
05 M Christchurch 2012	20 C Manawatu 2012	75 S <i>Queenstown</i>	57 N <i>Tokoroa</i>
56 M Christchurch West 2012	59 N <i>Mangakino</i>	83 N Raglan 2012	63 C Upper Hutt 2012
51 N Eastern Bay of Plenty 2012	21 N Manukau 2012	32 C <i>Rahotu Coastal</i>	43 N Waihi & Districts 2012
08 S Eastern Southland 2012	22 C Marlborough 2012	62 M Reefton-Buller 2012	81 N Waikato VHF 2012
09 C <i>Egmont</i>	23 C <i>Marton &amp; Districts</i>	71 N Rodney 2012	45 C <i>Waimarino</i>
78 N Far North Districts 2012	44 N <i>Malamata</i>	33 N Rotorua 2012	46 C Wairarapa 2012
70 C <i>Fielding</i>	85 N Mercury Bay 2012	34 M South Canterbury 2012	47 C Waitara 2012
10 N Franklin 2012	24 C Motueka 2012	35 S South Otago 2012	55 N Waitomo 2012
11 C Gisborne 2012	25 C Napier 2012	87 M South Taranaki 2012	48 C Wanganui 2012
12 N Hamilton 2012	26 C Nelson 2012	36 M <i>South Westland</i>	50 C Wellington 2012
14 C <i>Hawera</i>	27 C New Plymouth 2012	82 M <i>Southern Wairarapa</i>	74 C Wellington VHF 2012
13 C Hawkes Bay 2012	37 S Southland 2012	86 M Suburban 2012	03 N Western Suburbs 2012
58 N <i>Helensville</i>	68 M North Canterbury 2012	06 C Tararua 2012	49 M Westland 2012
80 N Hibiscus Coast 2012	64 S North Otago 2012	38 N <i>Taumarunui</i>	28 N Whangarei 2012

Letter after Branch number denotes electoral district – N=Northern, C=Central, M=Midland, S=Southern. *Italics* = Branches in recess.

Affiliated Branches: Canterbury Amateur Radio Development Society Inc (CARDS).

### 01 Ashburton

Branch Call-sign ZL3AF and ZL3AQ  
Physical Address Ashburton 4WD Clubrooms  
Postal Address 36 Maronan Road, Tinwald, Ashburton 7778  
President c/- 37 Nelson St., Hampstead, Ashburton 7700  
Secretary Ken Duffy ZL4KD  
Net Information Brian Rickard ZL3TJW  
Contact Persons George Dreaver ZL3NQ  
Contact Phone No Brian Rickard ZL3TJW (027) 222-1236  
Contact Email brickard@electash.co.nz  
Meeting Information Second Monday of the month  
(except December) at 1930 hours.

### 02 Auckland (Inc)

Branch Call-sign ZL1AA  
Physical Address 400 St. Johns Road, Kohimarama,  
Auckland 1071  
Postal Address PO Box 18-003, Glen Innes, Auckland 1743.  
President George Marr ZL1TUJ  
Vice President  
Secretary Wallace Bottomley ZL1WAL  
Net Information VHF 145.775 MHz at 2000 hours every Thursday and  
HF 3.645.00 MHz at 2000 hours every Monday  
Contact Persons Gwynne Rowe ZL1AAR and Steve Miller ZL1FS  
Contact Phone No (09)524-9969 or rgwynne.rowe@extra.co.nz and (021)  
0226-4981  
Contact Email ZL1FS@nzart.org.nz  
Meeting Information Every 3rd Saturday of the month (Feb to Nov) there is  
General meeting at 1330 hours; preceded by a BBQ  
at Noon and followed by some activity\*.  
Committee Meeting Every 1st Tuesday of the month at 1930. Members  
are welcome to attend but must be invited to speak.  
Web \*See web page www.qrz.net/ZL1AA under  
Newsletter tab that advertises our next activity.  
General Information Clubrooms are open on Saturday mornings after  
1000 hours for anybody to drop in, have a rag chew,  
use the club's rigs, search through back issues of  
magazines or simply have a cuppa.

### 03 Western Suburbs Radio Club (Inc)

Branch Call-sign ZL1AC  
Physical Address 3000 Great North Road, New Lynn, Waitakere City  
Postal Address PO Box 15-122, New Lynn, Waitakere City 0640  
President Ian Sangster ZL1RCA  
Secretary Roy Milam ZL1WI (09) 814-9550  
Net Information VHF 146.5250MHz simplex Wednesday at  
1930 hours, HF 3650KHz Friday at 1930 hours  
Contact Persons Ian Sangster ZL1RCA  
Contact Phone No (09) 814-9597  
Contact Email sangsfam@clear.net.nz  
Meeting Information Fourth Saturday of the month at 1000 hours at club  
rooms  
Committee Meeting Preceeds General Meeting at 0900 hours  
Web www.qsl.net/zl1ac  
General Information Branch 03 is dedicated to Contesting and AREC.  
The Club also runs an APRS digi, ZL1AC-1 on  
144.550. Branch 03 extends a welcome to all hams  
to visit us on air or at the clubrooms.

### 04 Cambridge Radio Club

Branch Call-sign ZL1HP  
Physical Address 22a Taylor Street, Cambridge 3434  
Postal Address Cambridge Radio Club, c/- Cambridge Community  
Centre, 22a Taylor St, Cambridge 3434  
President Raymond McNickle ZL1RGM  
Secretary Ian Honey ZL1IAN  
Treasurer Ian Honey ZL1IAN  
Contact Persons Roger Kelly ZL2AYK  
Contact Phone No AH (07) 827-7911 or Bus (07) 827-9283  
Meeting Information Every Wednesday at 1930 hours  
Committee Meeting Third Wednesday of the month at 1930 hours

#### 05 Christchurch Amateur Radio Club (Inc)

Branch Call-sign ZL3AC  
Physical Address 27 Galbraith Avenue, Avonside, Christchurch  
Postal Address PO Box 1733, Christchurch 8015  
President David Holland ZL2IC  
Vice President Ian MacPherson ZL3TAO  
Secretary Rory Deans ZL3HB  
Treasurer Richard Prattley ZL3UE  
Net Information Canterbury 725 Repeater 147.250 +600 on Sundays at 2000NZT Or after the Official Broadcast on the last Sunday in the Month  
Rory Deans ZL3HB  
Contact Persons (03) 325-4181  
Contact Phone No rory1@xtra.co.nz  
Contact Email  
Meeting Information First Wednesday of the month (February to December) at 1930 hours. "Social get-together & technical night" every Tuesday night 1930 hours (February to December)  
Committee Meeting Monday after First Wednesday each month at 1930 hours  
Web <http://www.chchhamradio.org.nz>  
General Information Publications: Hamlinks – contact Kelvin Barnsdale ZL3KB

#### 06 Taranua District Radio Club (Inc)

Branch Call-sign ZL2IB  
Physical Address Taranua Television Studios, Regent St., Pahiataua  
Postal Address C/- 57 Cole St., Dannevirke 4930  
President Jim Edwards ZL1UBE  
Vice President Paul Harris ZL2PFH  
Secretary Stephen Cooper ZL2WAU  
Treasurer Stephen Cooper ZL2WAU  
Net Information Every Friday Night at 2000 hours on Wharite 146.650 MHz  
Contact Persons Stephen Cooper ZL2WAU  
Contact Phone No (06) 374-8288  
Contact Email rosewoodvilla@xnet.co.nz  
Meeting Information Third Sunday of each month (except December and January) at Taranua Television Studios, Regent St., Pahiataua at 1330 hours  
Web <http://www.qsl.net/zl2ib>  
General Information Charities Entity Registration Number CC35193, Club Repeaters Wharite Voice – 146.625MHz, Taranua Voice/Data - 439.600MHz, STSP – 146.825MHz

#### 08 Eastern Southland

Branch Call-sign ZL4AL  
Physical Address Latham Road, East Gore  
Postal Address C/- PO Box 9, Wyndham 9849  
President Ross Dickie ZL4DIK  
Secretary Lindsay Eunson ZL4LC  
Treasurer Ron Falconer ZL4RMF  
Contact Persons Colin Robertson ZL4KJ  
Contact Phone No (03) 208-5979  
Contact Email eunsonplumbing@xtra.co.nz  
Meeting Information 3rd Wednesday of the month at 2000 hours at Latham Road Clubrooms in summer months and St. Andrews Church Hall in winter months

#### 09 Egmont

Branch Call-sign In recess

#### 10 Franklin Amateur Radio Club (Inc)

Branch Call-sign ZL1SA  
Physical Address 19 Stadium Drive, Pukekohe  
Postal Address C/- 25 John Street, Pukekohe 2120  
President Bruce Dunsbee ZL1TDH  
Vice President Mike Jane ZL1UOM  
Secretary Tom McDonald ZL1TO  
Net Information 3700 kHz on Sundays at 0900 and Bombay 690 on Sundays at 0930 hours  
Contact Persons Bob Holt ZL1BBZ  
Contact Phone No (09) 235-9549  
Contact Email zl1to@nzart.org.nz  
Meeting Information Third Tuesday each month at 2000 hours  
Committee Meeting First Tuesday each month at 1930 hours

#### 11 Gisborne Amateur Radio Club (Inc)

Branch Call-sign ZL2AA  
Physical Address Scout Hall, Bryce Street, Gisborne  
Postal Address PO Box 753 Gisborne 4040  
President Pet L2TRG  
Vice President Rowley Haisman ZL2APH  
Secretary Ross Meban ZL2RWM  
Treasurer Alan McIntosh ZL2AOP  
Net Information 146.800 MHz every Sunday from 1930 hours  
Contact Persons Ross Meban ZL2RWM  
Contact Phone No (06) 867-3402  
Contact Email rmeban@slingshot.co.nz  
Meeting Information General meeting second Monday of the month (excluding public holidays) at 1900 hours. Committee meets monthly usually first Monday.  
Web <http://ZL2AA.OnNZ.net/>  
General Information IRLP Node 6105. Gisborne. New Zealand

#### 12 Hamilton Amateur Radio Club (Inc)

Branch Call-sign ZL1UX  
Physical Address 88 Seddon Road, Hamilton.  
Postal Address PO Box 606, Waikato Mail Centre, Hamilton 3240  
President Jono Jonassen ZL1UPJ  
Vice President Gavin Petrie ZL1GWP, Raymond McNickle ZL1RGM  
Secretary Phil King ZL1PK  
Treasurer Tom Powell ZL1TJA  
Net Information 3575 kHz on Mondays at 1930 hours and 146.525 MHz FM simplex on Tuesdays at 2000 hours  
Contact Persons Gavin Petrie ZL1GWP or Phil King ZL1PK  
Contact Phone No Phil King (07) 847-1320 or Gavin Petrie (07) 843-0326  
Contact Email branch.12@nzart.org.nz  
Meeting Information General Meeting third Wednesday of each month (except December) at 1930 hours at the clubrooms  
Committee Meeting Executive Meeting first Wednesday (except January) at 1930 hours at the clubrooms  
Web <http://zl1ux.tripod.com>  
General Information Annual Market Day in mid August each year

#### 13 Hawkes Bay Amateur Radio Club

Branch Call-sign ZL2AS and ZL2QS  
Postal Address C/- PO Box 2403, Stortford Lodge, Hastings 4153  
President Rob Leicester ZL2RFL  
Secretary David Walker ZL2DW  
Net Information 3615 kHz and 439.175 MHz Repeater on Sundays at 0900 hours  
Contact Persons David Walker ZL2DW  
Contact Phone No Wk (06) 876-5014, Hm (06) 876-0518, Cell (02) 745-02501  
Contact Email david@apexradiocoms.co.nz  
Meeting Information Fourth Wednesday each month (except December) at 1930hours at Pakowhai Hall. Pakowhai Rd, (opposite Brookfields Rd), Hastings.

#### 14 Hawera Amateur Radio Club

Branch Call-sign In recess, absorbed into South Taranaki, Branch 87

#### 15 Central Hawkes Bay

Branch Call-sign In Recess

#### 16 Horowhenua

Branch Call-sign ZL2DS  
Postal Address C/- 2 Oslo Place, Levin  
President Kenneth Ireland ZL2KI  
Secretary L. Jury ZL2JU  
Net Information 3720 kHz on Wednesdays at 2030 hours and 147.575 Simplex on Sundays at 0900 hours  
Contact Persons Kenneth Ireland ZL2KI  
Contact Phone No (027) 444-9449  
Contact Email br16nzart@gmail.com  
Meeting Information Third Monday of Every Second month (same as Break-in) at 1930 hours

#### 17 Huntly Radio Club

Branch Call-sign ZL1BL  
Physical Address 520 Kainui Road, Taupiri  
Postal Address 195 Rotongaro Road, RD2 Huntly 3772  
President Terry East ZL1BGS  
Secretary Jim Williams ZL1BOS  
Contact Persons Terry East ZL1BGS  
Contact Phone No (07) 826-6730 or (07) 824-6805  
Contact Email granteast1@thenet.net.nz  
Meeting Information Fourth Tuesday at 1930 hours at 520 Kaunui Rd. Taupiri



**18 Hutt Valley (Inc)**

Branch Call-sign ZL2HV  
 Physical Address Off Birch St, Philip Evans Reserve, Waterloo,  
 Lower Hutt  
 Postal Address PO Box 30-519, Lower Hutt, 5040  
 President Don Cuthbert ZL2DON  
 Vice President Jim McKensie ZL4CV  
 Secretary Chris Purcell ZL2POS  
 Treasurer Gavin Cross ZL2TVM  
 Net Information 7075 kHz on Sundays at 0900  
 Contact Persons President Don Cuthbert  
 Contact Phone No (04) 586-3955  
 Contact Email donaldcuthbert@xtra.co.nz  
 Meeting Information First Monday each month at 1930 (except for June  
 which is on 2nd Monday for AGM). Also every Friday  
 at 1930 (informal)  
 Web <http://www.zl2hv.wellington.net.nz>

**19 Inglewood**

Branch Call-sign In Recess  
 District Central  
 Contact Persons Graeme Meads ZL2TGM  
 Contact Phone No (06) 756-7998

**20 Manawatu Amateur Radio Society (Inc)**

Branch Call-sign ZL2KO  
 Physical Address 65 Totara Road, Palmerston North 4412  
 Postal Address PO Box 1718, Palmerston North 4440  
 President Richard Prior ZL2KP  
 Vice President Chester Clark ZL2AFJ  
 Secretary Cheryl Wheatley ZL2VCC  
 Treasurer John de Burgh ZL2TG  
 Net Information 3570 kHz on Sundays at 0900 hours and 147.125  
 MHz on Thursdays at 2000 hours  
 Contact Persons Chester Clark ZL2AFJ  
 Contact Phone No (06) 357-2829  
 Contact Email clark.j.c@xtra.co.nz  
 Meeting Information First Wednesday each month at 1930 hours, fourth  
 Wednesday 1400 for "Old Timers Social "natta  
 session" between March and October.  
 Committee Meeting Second Wednesday at 1930 hours  
 Web <http://zl2ko.org.nz/>

**21 Manukau**

Branch Call-sign ZL1QB  
 Physical Address 8 Guide Place, Papatoetoe, Auckland 2025  
 Postal Address 8 Guide Place, Papatoetoe, Auckland 2025  
 President Jim Paltridge ZL1JW  
 Secretary Terry Rist ZL1TR  
 Net Information 3655 kHz and 146.550 MHz on Sundays at  
 0900 hours  
 Contact Persons Terry Rist ZL1TR  
 Contact Phone No (09) 279-9677  
 Contact Email risty@vodafone.co.nz  
 Meeting Information Third Wednesday each month at 1930 hours. Day  
 meeting first Monday each month at 1000 hours.  
 Construction Night 4th Wednesday each month at  
 1930 hours.  
 Committee Meeting Combined with General Meeting

**22 Marlborough Amateur Radio Club (Inc)**

Branch Call-sign ZL2KS and ZL2MARC  
 Physical Address Marlborough EOC, Wither Road (West Extension),  
 Blenheim  
 Postal Address PO Box 432, Blenheim 7315  
 President Kaye Hannagan ZL2KU  
 Vice President Rob Carter ZL2IW  
 Secretary Bill Cousins ZL2AYZ  
 Treasurer Ken Hynds ZL2KHZ  
 Net Information Blenheim 146.950, 145.600 and 147.225 on Mondays  
 at 1930 hours.  
 Contact Persons Ken Hynds ZL2KHZ  
 Contact Phone No (03) 579-2297  
 Contact Email b.cousins@xtra.co.nz  
 Meeting Information 2nd Thursday of the month, Social Group 3rd  
 Thursday of each month  
 Committee Meeting 4th Thursday of the month

**23 Marton and Districts (Inc)**

Branch Call-sign ZL2AMS  
 Physical Address 7A Humphrey St., Marton 4710  
 Postal Address 7A Humphrey St., Marton 4710  
 President Stewart Neal ZL1TCG  
 Secretary Joe Reed ZL2AH  
 Net Information Taihape 6775 repeater on Sundays at 2000 hours  
 Contact Persons Joe Reed ZL2AH  
 Contact Phone No (06) 327-7003  
 Contact Email joereed@actrix.co.nz  
 Meeting Information At members homes. Contact secretary for details

**24 Motueka (Inc)**

Branch Call-sign ZL2GK  
 Physical Address S.A.R. room, Motueka Police Station, High Street  
 Postal Address PO Box 218, Motueka 7143  
 President Owen Dennis ZL2GLG  
 Vice President Steve Fogerty ZL2ASF  
 Secretary Doug Anderson ZL2DJA  
 Treasurer Doug Anderson ZL2DJA  
 Contact Persons Steve Fogerty ZL2ASF  
 Contact Phone No (03) 528-9366  
 Meeting Information First Monday each month 1930 hours at SAR room,  
 Motueka Police Station (Check with contact person)

**25 Napier Amateur Radio Club (Inc)**

Branch Call-sign ZL2GT  
 Physical Address 123 Latham Street, Marewa, Napier 4001  
 Postal Address 120 Kent Tce, Taradale, Napier 4112  
 President Laurie Winton ZL2TC  
 Secretary Karl Matthys ZL1TJ  
 Treasurer Stan White ZL2ST  
 Net Information 3615 kHz and 439.175 Hawkes Bay on Sundays  
 at 0900 hours.  
 Contact Persons Laurie Winton ZL2TC  
 Contact Phone No (06) 843-8519  
 Contact Email lauriejw@xtra.co.nz  
 Meeting Information First Wednesday of the month at 1930 hours at  
 Clubrooms (except January)

**26 Nelson Amateur Radio Club**

Branch Call-sign ZL2ARG  
 Physical Address Nelson Car Club Rooms, Bolt Rd, Tahunanui, Nelson  
 Postal Address PO Box 414, Nelson 7040  
 President Paul Moffatt ZL2PO  
 Secretary Jim Meachen ZL2BHF  
 Net Information HF net on Sunday Mornings at 0900 hours 3890kHz,  
 Nag Net ( Nelson Amateur Girls ) on Wednesday  
 Nights at 0730 hours on the 147.025 repeater  
 Contact Persons Jim Meachen ZL2BHF  
 Contact Phone No (03) 545-0354  
 Contact Email jim.m@clear.net.nz  
 Meeting Information Third Wednesday (Feb to Nov) at 1930 hours in  
 the Nelson Car Club rooms, Bolt Road, Tahunanui,  
 Nelson  
 Committee Meeting First Wednesday of the month.  
 Venue: Committee Members Homes  
 Web <http://www.branch26nzart.blogspot.co.nz>

**27 New Plymouth Amateur Radio Club (Inc)**

Branch Call-sign ZL2AB  
 Physical Address Taranaki Emergency Management Office,  
 45 Robe Street, New Plymouth  
 Postal Address C/- Taranaki Emergency Management Office,  
 45 Robe Street, New Plymouth 4310  
 President Frank Hunt ZL2BR  
 Vice President Barrie Vivian ZL2LA  
 Secretary Graeme Jury ZL2APV  
 Treasurer Ngaire Jury ZL2UJT  
 Net Information Wednesday at 2000 hours on 147.200 MHz repeater  
 Contact Persons Graeme Jury ZL2APV  
 Contact Phone No (06) 755-2444 (Graeme Jury)  
 Contact Email gvj@orcon.net.nz or Roy Symon ZL2KH  
 Meeting Information 2nd Tuesday (February to November) second  
 Tuesday in December (AGM)  
 Web <http://www.nzart.org.nz/assets/nparc/index.html>

## 28 Whangarei Amateur Radio Club (Inc)

Branch Call-sign ZL1AM  
Physical Address Kiwi North, 500 State Highway 14, Maunu, Whangarei  
Postal Address PO Box 10-078, Te Mai, Whangarei 0143  
President Brian Winger ZL1BSW  
Vice President Paul Slako ZL1PC  
Secretary Allan Walker ZL1AW  
Treasurer Don Ewen ZL1DTE  
Net Information VHF Net Thursdays at 2000hrs on Whangarei 665 (146650 MHz) HF Net Sundays at 2030hrs on 3585kHz. CW Improvers Tuesday at 2000hrs on 3580kHz  
Contact Persons Allan Walker ZL1AW  
Contact Phone No (09) 435-1413  
Contact Email nedq@xtra.co.nz  
Meeting Information First Wednesday each month at 1930 hours. Informal gatherings at the clubroom every Wednesday at 1700 hours  
Committee Meeting Last Wednesday of the month 1900hrs at clubroom  
Web <http://www.nzart.org.nz/assets/warc-28/index.html>

## 29 North Shore Amateur Radio Club (Inc)

Branch Call-sign ZL1AB  
Physical Address Civil Defence HQ, 400 East Coast Road, Sunnynook, North Shore  
Postal Address CD HQ, 400 East Coast Road, Sunnynook, North Shore 0630  
President Julian Dukes ZL1ABX  
Secretary Alan Wooller ZL1AUW  
Treasurer Mike Cumin ZL1CCD  
Net Information 147.425 MHz on Wednesdays at 1930 hours  
Contact Persons Julian Dukes ZL1ABX  
Contact Phone No (09) 473-5204  
Contact Email jules\_d@xtra.co.nz  
Meeting Information First Monday in the month (except June and July 2012 – 2nd Monday)  
Committee Meeting 3rd Monday in the month (except December)  
Web <http://www.qsl.net/zl1ab>

## 30 Otago (Inc)

Branch Call-sign ZL4AA  
Physical Address 109 Macandrew Road, South Dunedin, Dunedin  
Postal Address PO Box 5485, Moray Place, Dunedin 9058  
President David Mulder ZL4DK  
Secretary Dave Howell ZL4TAQ  
Net Information Dunedin 690 each Sunday at 1930 hours, 3613kHz each Sunday at 2000 hours.  
Contact Persons Dave Howell ZL4TAQ  
Contact Phone No (03) 488-5488  
Contact Email davanniehowell@xtra.co.nz  
Meeting Information Every Wednesday (except late Dec/early Jan) at 1930 hours  
Committee Meeting Second Wednesday of the month at 1930 hours  
Web [www.zl4aa.org.nz](http://www.zl4aa.org.nz)

## 31 Pahiatua

Branch Call-sign In Recess, refer to Branch 06

## 32 Rahoitu Coastal Inc Opunake Radio Club

Branch Call-sign In recess, absorbed into South Taranaki, Branch 87

## 33 Rotorua Amateur Radio Club (Inc)

Branch Call-sign ZL1ROT  
Physical Address Rotorua Watersports Centre, 1 Mataiwhera Street, Rotorua 3043  
Postal Address PO Box 6194, Whakarewarewa, Rotorua 3043  
President Rene de Wit ZL1RDW  
Secretary James Comber ZL1BWC  
Treasurer Margaret Bretherton ZL1MB  
Net Information Wednesday on 144.350MHz Repeater at 2030 hours  
Contact Persons James Comber ZL1BWC  
Contact Phone No (07) 347-8265  
Contact Email james.comber@slingshot.co.nz  
Meeting Information General Meeting 3rd Tuesday each month. Technical Meeting 1st Tuesday each month at 1930 hours

## 34 South Canterbury

Branch Call-sign ZL3UR  
Physical Address Model Engineers clubrooms, corner Rose and Catherine Streets, Timaru  
Postal Address C/- PO Box 261 Timaru  
President James O'Hare ZL3JH  
Secretary David Hetherington ZL3UDH  
Net Information Timaru 6625 on Wednesdays at 1500 hours  
Contact Persons David Hetherington ZL3UDH  
Contact Phone No (03) 688-3619  
Contact Email zl3udh@nzart.org.nz  
Meeting Information Last Monday of each month (except December) at 1930 hours

## 35 South Otago

Branch Call-sign ZL4JF  
Physical Address Main South Road, Balclutha.  
Postal Address C/- Cliff Gray, Stony Creek RD 2, Balclutha 9272  
President Ron Blair ZL4TL  
Secretary Cliff Gray ZL4AS  
Net Information 3585 kHz on Mondays at 2030 hours and Kuriwao 675 on Mondays at 1930 hours  
Contact Persons Cliff Gray ZL4AS  
Contact Phone No (03) 418-1488  
Contact Email zl4as@nzart.org.nz  
Meeting Information First Tuesday of even months, plus March and November at 2000 hours (1930 hours in winter)

## 36 South Westland

Branch Call-sign In recess  
General Information

## 37 New Zealand Association of Radio Transmitters Southland Branch (Inc)

Branch Call-sign ZL4GQ  
Physical Address 249 Ettrick Street, Invercargill,  
Telephone (03) 218-8686  
Postal Address PO Box 1260, Invercargill 9840  
President Bill Obers ZL3TPE  
Vice President Daniel Erickson ZL4DE  
Secretary Alex Gordon  
Treasurer Amy Hamilton  
Net Information 145.775MHz and 146.800MHz on Sunday at 2000 hours  
Contact Persons Bill Obers ZL3TPE  
Contact Phone No (03) 215-9765 or (027) 432-1776  
Contact Email president@zl4gq.com  
Meeting Information Second Tuesday of each month (except January) at 1930 hours  
Committee Meeting Second Tuesday of each month (except January) at 1900 hours  
General Information AREC Meeting 1st Tuesday of each month at 1930 hours

## 38 Taumarunui

Branch Call-sign In Recess

## 39 Tauranga Districts Amateur Radio Club (Inc)

Branch Call-sign ZL1TP  
Physical Address Tauranga Coast Guard HQ, Sulphur Point Marina, Tauranga  
Postal Address 155 Pillans Road, Otumoetai, Tauranga 3110  
President Neill Ellis ZL1TAJ  
Vice President Brian Heywood ZL1IE  
Secretary Roy Hopkins ZL1RJH (07) 576-1234 or  
E-mail roy.hopkins@xtra.co.nz  
Contact Persons Brian Heywood ZL1IE  
Contact Phone No (07) 543-3677  
Contact Email brian@eol.co.nz  
Meeting Information a) Second Thursday every second month (Feb, April, June, Aug, Oct, Dec)  
b) Special meeting in May to discuss remits for NZART members even if not branch members  
General Information Repeaters 680 (linked to Te Puke 7175) & 855

## 40 Te Awamutu Amateur Radio Club

Branch Call-sign ZL1CB  
Physical Address C/- 550 Kane St., Pirongia 3802  
Postal Address C/- 550 Kane St., Pirongia 3802  
President Bernard Westerbaan ZL1WT  
Secretary Sabina Owen ZL2AZY  
Net Information 3760+/- kHz on Thursdays at 2000 hours  
Contact Persons Bernard Westerbaan ZL1WT or Sabina Owen ZL2AZY  
Contact Phone No (07) 871-7039 or (07) 871-9992  
Contact Email zl1wt@xtra.co.nz  
Meeting Information Telephone Bernard Westerbaan at (07) 871-7039



#### 41 Thames

Branch Call-sign ZL1DF  
Physical Address 146 Maramarahi Road, RD1, Thames  
Postal Address 146 Maramarahi Road, RD1, Thames  
President Ken Hayhurst ZL1ATU  
Vice President John Halden ZL1ALA  
Secretary David Kitchen ZL1CDJ  
Treasurer John Halden ZL1ALA  
Net Information 3850kHz and 145.700 MHz on Sundays at 0900 hours.  
Contact Persons Ken Hayhurst ZL1ATU  
Contact Phone No (07) 868-7330  
Contact Email k.hayhurst@xtra.co.nz  
Meeting Information Quarterly 2nd Tuesday (February, May, August, and November) at Thames Civil Defence Rooms, Mackey Street, Thames

#### 42 Titahi Bay Amateur Radio Club (Inc)

Branch Call-sign ZL2AFV  
Physical Address Tireti Hall, corner Tireti Road and TePene Avenue, Titahi Bay  
Postal Address PO Box 50-402, Porirua 5240  
President Ken Pattle ZL2TKY  
Secretary Phil Slater ZL2OWL  
Net Information 3710 kHz on Sundays at 2000 hours, visitors welcome  
Contact Persons Ken Pattle ZL2TKY  
Contact Phone No Tel (04) 237-4616  
Contact Email z12afv@tbarc.org.nz  
Meeting Information First Tuesday of the month (except January) at 1930 hours  
Web http://www.tbarc.org.nz  
General Information Regular informal activities, call contact number for information.

#### 43 Waihi and Districts

Branch Call-sign ZL1QW  
Postal Address Mr D McGuire, 14 Snell Crescent, Waihi Beach 3611  
President M G Schaare ZL1MGS  
Vice President Alan Pooley ZL1KV  
Secretary D. McGuire ZL3DM  
Treasurer D. McGuire ZL3DM  
Contact Persons D. McGuire ZL3DM  
Contact Phone No (07) 863-5484  
Meeting Information Meeting Information: First Saturday, February, AGM 2nd Saturday March, First Saturday, May, July, September, November. At 1300 hrs.  
Ring Secretary for location

#### 44 Matamata Radio Club

Branch Call-sign In Recess

#### 45 Waimarino

Branch Call-sign In recess

#### 46 Wairarapa Amateur Radio Club (Inc)

Branch Call-sign ZL2OA  
Physical Address Hood Aerodrome, Manaia Road, Masterton  
Postal Address PO Box 860, Masterton 5840  
President Neil Richardson ZL2UN  
Vice President David Bray ZL2BA  
Secretary Paul London ZL2BEF  
Treasurer Edwin O'Hara ZL2AHU  
Net Information Masterton 680 on Mondays at 2000 hours except meeting nights  
Contact Persons Paul London ZL2BEF  
Contact Phone No (06) 378-2388  
Contact Email paullondon@actrix.co.nz  
Meeting Information Second Monday each month (except January) at 1930 hours in club rooms Manaia Road, Masterton  
Held at 1930 hours on the Tuesday proceeding the Branch monthly meeting in club rooms Manaia Road, Masterton  
Committee Meeting  
General Information Branch E-mail: branch46@gmail.com

#### 47 Waitara Amateur Radio Club

Branch Call-sign ZL2TO  
Physical Address 77 Grey St., Waitara 4320  
Postal Address C/- L Smart 48 Leslie St., Waitara 4656  
President Ian Cash ZL2BRA  
Secretary Larry Smart ZL2SM  
Contact Persons Larry Smart ZL2SM  
Contact Phone No Larry Smart ZL2SM  
Meeting Information First Sunday each month (except January). Where a Statutory Holiday falls on a Monday the meeting is deferred one week

#### 48 Wanganui Amateur Radio Society (Inc)

Branch Call-sign ZL2JA  
Physical Address Stalkers and Hunters Hall, 100 Peat Street, Wanganui 4500  
Postal Address c/o 1 Caversham Rd., Westmere, Wanganui 4501  
President Ivan Horn ZL2ATU  
Secretary Barry Stewart ZL2RR  
Treasurer Barry Stewart ZL2RR  
Net Information Each Tuesday 2000 hours on 146.900 MHz (Wanganui 690)  
Contact Persons Ivan Horn ZL2ATU  
Contact Phone No (06) 343 6979  
Contact Email loobie@kol.co.nz  
Meeting Information First non-public holiday Monday each month (except January and July) at 1930 hours  
Web www.zl2ja.org.nz

#### 49 Westland

Branch Call-sign ZL3GY  
Postal Address 37 Chapel Street, Greymouth  
President Bob McQuarrie ZL3TY  
Secretary Graham Hay ZL3WMM  
Net Information Westland 695 to contact club members  
Contact Persons Graham Hay ZL3WMM  
Contact Phone No (03) 768-9499  
Contact Email z13wmm@nzart.org.nz  
Meeting Information First Wednesday each month (except January) at 1930 hours. Meeting held at Electronet Services, Tainui St. Building, Greymouth

#### 50 Wellington Amateur Radio Club (Inc)

Branch Call-sign ZL2WB  
Physical Address WEMO Building, corner Murphy and Turnbull Streets, Thorndon, Wellington  
Postal Address PO Box 6464, Marion Square, Wellington 6035  
President Chairman: Mike Woods ZL1AXG  
Vice President Colin McKenzie ZL2COL  
Secretary Andrew Goldie ZL2ACG  
Treasurer Doug McNeill ZL2AOV  
Net Information 7050 kHz on Sundays at 0930 hours  
Contact Persons Tony Fletcher ZL2ALJ  
Contact Phone No (04) 383-8838  
Contact Email z12alj@paradise.net.nz  
Meeting Information Third Monday each month (except December) at 1930 hours  
Web sites.google.com/site/warc50  
General Information Information on Quartz Hill Contest Station ZL6QH see www.zl6qh.com

#### 51 Eastern Bay of Plenty

Branch Call-sign ZL1WK  
Physical Address Waiewe Street, Hillcrest, Whakatane  
Postal Address C/- Bevan Schwass, 24 Mokorua Grove, Whakatane 3120  
President Acting - Bevan Schwass ZL1SZ  
Secretary Bevan Schwass ZL1MJ  
Treasurer Harry C Webber ZL1BCW  
Contact Persons Alan McDonald ZL1PI  
Contact Phone No (07) 308-7740  
Contact Email BevanSchwass@xtra.co.nz  
Meeting Information Second Wednesday each month (except January) at 1930 hours  
Web http://www.zl1wk.yolasite.com/

#### 52 Northern Hawkes Bay

Branch Call-sign In recess

#### 53 Te Puke Amateur Radio Club (Inc)

Branch Call-sign ZL1IB  
Physical Address C/- Te Puke Holiday Park, 2122 State Highway 2, Te Puke  
Postal Address C/- S.J. Rowe, 223 State Highway 33, RD 9, Te Puke 3189  
President Andrew Race ZL1TAP  
Vice President Neill Ellis ZL1TAJ  
Secretary Syd Rowe ZL1LWR  
Treasurer Syd Rowe ZL1LWR  
Net Information 3690 kHz at 0830 hours on Sundays  
Contact Persons Syd Rowe ZL1LWR  
Contact Phone No Telephone (07) 533-1029  
Contact Email syd.rowe@xtra.co.nz  
Committee Meeting 2nd Saturday each month at 1330 hours  
General Information Clubrooms open every Saturday from 1300 hours

#### 54 Patea

Branch Call-sign In recess, absorbed into South Taranaki, Branch 87

**55 Waitomo Radio Club**

Branch Call-sign ZL1Z  
 Physical Address Thomson Avenue, Otorohanga  
 Postal Address C/- 56 Puahue Road, RD5, Te Awamutu 3875  
 President Andrew Leadey ZL4SQ  
 Secretary Ihian Howitt ZL1BZ  
 Net Information Waitomo 7375 on Sundays at 0900 hours  
 Contact Persons Andrew Leadey ZL4SQ  
 Contact Phone No (07) 871-8875  
 Contact Email andrewleadey@gmail.com  
 Meeting Information As required at members homes

**56 Christchurch West Amateur Radio Club (Inc)**

Branch Call-sign ZL3VV  
 Physical Address Auburn Park, Upper Riccarton  
 Postal Address C/- PO Box 31-095, Ilam, Christchurch 8444  
 President Maurice McNab ZL3MEM  
 Vice President Denis Coulter ZL3DEN  
 Secretary Mark Carshalton ZL3BA  
 Treasurer Peter Tyerman ZL3IA  
 Net Information Cass Peak 145.625MHz linked to Tekapo  
 146.800MHz on Sundays at 2000 hours (except  
 delayed last Sunday of the month after Official  
 Broadcast)  
 Contact Persons John Walker ZL3IB  
 Contact Phone No (03) 348-9084  
 Contact Email john.zl3ib@ihug.co.nz  
 Meeting Information Fourth Tuesday of each month (except December) at  
 1930 hours. "Free n Easy" second Wednesday each  
 month (except January) at 1330 hours  
 Committee Meeting 3rd Tuesday of each month at 1930 hours  
 Web www.radioamateurs.org.nz

**57 Tokoroa**

Branch Call-sign In recess

**58 Helensville**

Branch Call-sign In recess

**59 Mangakino**

Branch Call-sign In recess

**60 Taupo Amateur Radio Club**

Branch Call-sign ZL1BCO  
 Physical Address Hickling Park, A.C. Baths Avenue, Taupo  
 Postal Address C/- 96 Lakewood Drive, Taupo 3330  
 President Kelvin Brooking ZL1KU  
 Vice President Roger Simmonds ZL1UTW  
 Secretary Graeme Frederick ZL1BU  
 Treasurer Peter Aurisch ZL2UEW  
 Net Information Taupo 675 on Mondays at 2000 hours  
 Contact Persons Graeme Frederick ZL1BU  
 Contact Phone No (07) 378-0553 or (021) 295-6023  
 Contact Email zl1bco@reap.org.nz  
 Meeting Information First Thursday of the month (except January) at  
 1930 hours at Club Rooms  
 Web www.reap.org.nz/~zl1bco/

**61 Central Otago**

Branch Call-sign ZL4OO  
 Physical Address Alexandra Fire Station  
 Postal Address C/- Brian Skeet, 329 Dunstan Road, 1 RD,  
 Alexandra 9391  
 President John Lochhead ZL4QS  
 Secretary Brian Skeet ZL4PN  
 Contact Persons Brian Skeet ZL4PN  
 Contact Phone No (03) 448-7245  
 Meeting Information Fourth Thursday each month (except June, July and  
 December) at 2000 hours at Alexandra Fire Station

**62 Reefton-Buller**

Branch Call-sign ZL3BRC  
 Physical Address 2 Cook Street, Carters Beach, Westport  
 Postal Address PO Box 11114, Waimangaroa 7848  
 President Maurice Bettridge ZL3DU, Telephone/Fax  
 (03) 789-8274  
 Secretary Hayden Bromley ZL2BCP  
 Net Information Saturday at 2030 hours (2000 hrs in summer)  
 on 3600kHz  
 Contact Persons Kevin Croker ZL3DAC  
 Contact Phone No (03) 789-9875  
 Meeting Information Monthly meeting - telephone Contact Maurice  
 Bettridge ZL3DU for date and venue.

**63 Upper Hutt (Inc)**

Branch Call-sign ZL2VH  
 Physical Address Rural Fire Station, Park Street, Upper Hutt  
 Postal Address c/o Peter Moore, 190 Plateau Road, The Plateau,  
 Upper Hutt 5018  
 President Mark Gooding ZL2UFI  
 Vice President Mark Wolstenholme ZL2WOL  
 Secretary Peter Moore ZL2HM  
 Treasurer Gavin Smith ZL2ACT  
 Contact Persons Mark Gooding ZL2UFI  
 Contact Phone No (04) 526-8446  
 Contact Email mark@foxtrot.co.nz  
 Meeting Information Every Friday night at 1930 hours NZT  
 Committee Meeting As required  
 Web www.zl2vh.org.nz  
 General Information IRLP Node 6931 on Climie 730. D-Star on Climie  
 5425 and Climie 860. 23CM on Climie 1292.

**64 North Otago**

Branch Call-sign ZL4OU  
 Physical Address Civil Defence Headquarters, Severn Street, Oamaru  
 Postal Address Branch 64, 18A Arun Street, Oamaru 9400  
 President Neil McLeod ZL4SN  
 Vice President Daniel Lewis ZL4DL  
 Secretary Gary Millar ZL4TA E-mail ganda43@xtra.co.nz  
 Treasurer Denis Browne ZL4DB  
 Contact Persons Alan Naish ZL4RB  
 Contact Phone No (03) 434-6363  
 Contact Email naishs@callsouth.net.nz  
 Meeting Information Second Monday of the month (except January) at  
 1930 hours, Civil Defence Headquarters, Severn  
 Street

**65 Papakura Radio Club (Inc)**

Branch Call-sign ZL1VK  
 Physical Address Wellington Park, 1R Great South Road, Papakura  
 Postal Address PO Box 72397, Papakura 2244  
 President Fred Vermeulen ZL1FAV  
 Vice President Richard Gamble ZL1BNQ  
 Secretary Ian Ashley ZL1AOX  
 Treasurer David Wilkins ZL1MR  
 Net Information ZL1VK on VHF - Ponga 147.325 MHz Sunday  
 mornings at 0830hrs followed by the HF net on 3.755  
 MHz, at 0900hrs local time  
 Contact Persons David Karrasch ZL1DK  
 Contact Phone No (09) 296-3180, (09) 296-8264 or (021) 560-180  
 Contact Email prc@ihug.co.nz  
 Meeting Information General Meeting first Wednesday each month at  
 1930 hours. Projects evenings on second & fourth  
 Wednesdays at 1930 hours. Day meeting fourth  
 Wednesday at 1330 hours. Any fifth Wednesday  
 AREC meeting on any 5th Wednesday at 1930 hrs.  
 Committee Meeting Third Wednesday of each month at 1930 hrs  
 Web www.qsl.net/zl1vk. Remote VHF Station ZL1CLUB  
 www.qsl.net/zl1club

**66 Auckland VHF Group (Inc)**

Branch Call-sign ZL1BQ  
 Physical Address Arthur Faulkner Reserve, Hazel Avenue,  
 Mt Roskill, Auckland  
 Postal Address PO Box 10138, Dominion Road, Auckland 1030  
 President John Dunn ZL1JD  
 Vice President Peter Loveridge ZL1UKG  
 Secretary Acting - Peter Loveridge ZL1UKG  
 Treasurer Doug Cooke ZL1TTE  
 Net Information 146.625 and 439.875 repeaters, Sundays 2015 hours  
 Contact Persons John Dunn ZL1JD  
 Contact Phone No (09) 473-9514  
 Contact Email john.dunn@clear.net.nz  
 Meeting Information Second Monday of the month at 1930 hours  
 Committee Meeting Last Monday of the month at 1930 hours  
 Web www.qsl.net/zl1bq  
 General Information Monthly Journal: Spectrum via email

**67 Kawerau Amateur Radio Hobbies Club**

Branch Call-sign ZL1KW  
 Physical Address Meetings held in members homes, confirm venue  
 with Secretary  
 Postal Address C/- 34 Cobham Drive, Kawerau 3127  
 President Barry Liddle ZL1CAY  
 Secretary Bev Osborne ZL1IOS  
 Treasurer Bob Krause ZL1TMK  
 Net Information 147.900MHz every Tuesday at 1930 hours  
 Contact Persons Bob Krause ZL1TMK  
 Contact Phone No (07) 323-8560  
 Contact Email rkrause@xtra.co.nz  
 Meeting Information Third Tuesday each month in members homes at  
 1930 hours. Confirm venue with Secretary at  
 (07) 323-7515



**68 North Canterbury Amateur Radio Club (Inc)**

Branch Call-sign ZL3RR  
 Physical Address Woodend-Lions Youth Centre, Rangiora-Woodend Road, Woodend  
 Postal Address PO Box 14, Woodend 7610  
 President Ann Fraser ZL3TNT  
 Vice President Don MacDonald ZL3DMC  
 Secretary Colin Rowe ZL3COL  
 Treasurer Denise Hider ZL3HI  
 Net Information VHF – Mount Noble 146.975 Mhz Sundays 2000hrs following the Regional 725 net. HF - 3.665 Mhz, first Thursday of the month, 0730 hrs UTC.  
 Contact Persons Colin Rowe ZL3COL  
 Contact Phone No (03) 313-2303  
 Contact Email colingr@xtra.co.nz  
 Meeting Information Second Thursday of the month (except January) at 1930 hours  
 Committee Meeting Fourth Thursday of each month  
 Web www.ncarcinc.com  
 General Information Monthly Newsletter: "Ragchew"

**69 Kapiti Amateur Radio Society (Inc)**

Branch Call-sign ZL2KB  
 Physical Address Cnr Aorangi Road and Tutanekai Street, Paraparaumu  
 Postal Address c/- 5A Konini Grove, Raumati Beach 5032  
 President John Wills ZL2ARI  
 Secretary (Acting) Bill Cox ZL2BIL  
 Net Information Kapiti 146.85 MHz on Sundays at 1930 hours  
 Contact Persons Bill Cox ZL2BIL  
 Contact Phone No (04) 902-2630  
 Contact Email bilicat@paradise.net.nz  
 Meeting Information Second Wednesday of the month at 1930 hours.  
 Committee Meeting 3rd Saturday of the month at 1000 hours.  
 General Information Clubrooms open every Saturday at 0930 hours. Visitors welcome.

**70 Fielding Radio Club**

Branch Call-sign ZL2AMR  
 Physical Address C/o 39 Seddon Street, Feilding 4702  
 Postal Address C/o 39 Seddon Street, Feilding 4702  
 President Mike Prior ZL2UKW  
 Secretary John de Burgh ZL2TG  
 Treasurer John de Burgh ZL2TG  
 Contact Persons John de Burgh ZL2TG  
 Contact Phone No (027) 290-3103  
 Meeting Information Last Wednesday of the Month – see website for details  
 Web http://zl2amr.servebbs.net/frc  
 General Information See website for details

**71 Rodney Amateur Radio Club (Inc)**

Branch Call-sign ZL1ROD  
 Physical Address Paul Kaufmann, 59 Lenzen Road, Box 404101, Puhoi 0951  
 Postal Address PO Box 587, Warkworth 0941  
 President Paul Kaufmann ZL1PAK  
 Secretary Alan Dale ZL1ABL  
 Treasurer Paul Sole ZL1VPS  
 Net Information VHF 147.300 MHz Repeater on Thursdays at 1930 hours  
 Contact Persons J.B. Smart ZL1BEY  
 Contact Phone No (09) 423-9129  
 Contact Email Jo-Car@xtra.co.nz  
 Meeting Information Second Saturday of the month at 1000 hours (except December First Saturday, January no meeting) at the Mahurangi Technical Institute, 11 Glenmore Drive, Warkworth  
 Web http://zl1rod.org

**72 Opotiki Amateur Radio Club (Inc)**

Branch Call-sign ZL1BY  
 Postal Address C/- 138 Wellington Street, Opotiki 3092  
 President Jim Jones ZL1JRJ  
 Secretary Jane Lake ZL1ONE  
 Contact Persons Steve Winder ZL1ACE  
 Contact Phone No (07) 315-7333  
 Contact Email zl1ace@wave.co.nz  
 Meeting Information Bi-monthly first Monday (March, May, July, September and November) at 1900 hours at the rear of St Stephen's Church.

**73 Northern Wairoa Electronics Club**

Branch Call-sign In Recess

**74 Wellington VHF Group (Inc)**

Branch Call-sign ZL2WA  
 Physical Address Tawa Community Centre, Cambridge Street, Tawa  
 Postal Address PO Box 12 -259, Thorndon, Wellington 6144  
 President Randall Prentice ZL2RJP  
 Vice President John Andrews ZL2HD  
 Secretary Rob Wallace ZL2WAL  
 Treasurer Tom Clarke ZL2TDD  
 Net Information 710 repeater on Wednesdays at 2000 hours  
 Contact Persons Rob Wallace ZL2WAL  
 Contact Phone No (04) 972-5571 or (021) 762-925  
 Contact Email zl2wa@clear.net.nz  
 Meeting Information Last Thursday each month (except December) at 1930 hours  
 Web www.vhf.org.nz

**75 Queenstown**

Branch Call-sign In recess

**76 Kaikoura**

Branch Call-sign In Recess

**77 Te Aroha and Districts Radio Club**

Branch Call-sign In recess

**78 Far North Districts Amateur Radio Club (Inc)**

Branch Call-sign ZL1FND  
 Physical Address Queen St, Awanui  
 Postal Address PO Box 4, Awanui 0441  
 President Bob Banks ZL1AUI  
 Secretary Russell Shackleton ZL1BQK  
 Net Information Far North 710 on Mondays at 1900 hours  
 Contact Persons Eric Manning ZL1GE  
 Contact Phone No (09) 406-7059  
 Contact Email rshack@xtra.co.nz  
 Meeting Information Meetings held as required

**79 Howick and Districts Radio Club**

Branch Call-sign In recess

**80 Hibiscus Coast Radio Society (Inc)**

Branch Call-sign ZL1HCR & ZL1FU  
 Physical Address 479/1 Whangaparaoa Road, Whangaparaoa 0932  
 Postal Address 479/1 Whangaparaoa Road, Whangaparaoa 0932  
 President Roger Smith ZL1XR  
 Vice President Hector Anderson ZL1BRY  
 Secretary Geoff Hayes ZL1UKB, Telephone (09) 426 4285  
 Treasurer Geoff Hayes ZL1UKB  
 Net Information 3810 kHz on Sundays at 0800 hours.  
 Contact Persons Geoff Hayes ZL1UKB or Fred Kennedy ZL1BYP  
 Contact Phone No (09) 424-5195 - The Club  
 Contact Email radioclub80@kol.co.nz  
 Meeting Information Third Wednesday even months at 1930, third Saturday odd months at 0930  
 Committee Meeting As advised  
 General Information AGM second Wednesday in March at 1930 hours

**81 Waikato VHF Group (Inc)**

Branch Call-sign ZL1IS  
 Physical Address C/- 64 Sunnyhills Avenue, Glenview, Hamilton, 3206  
 Postal Address PO Box 606, Waikato Mail Centre, Hamilton, 3240  
 President Alan Wallace ZL1AMW  
 Secretary Gavin Petrie ZL1GWP  
 Net Information WaiPlenty Network on 695 and 5675 on Sundays at 2045  
 Contact Persons Gavin Petrie ZL1GWP  
 Contact Phone No (07) 843-0326  
 Contact Email branch.81@nzart.org.nz  
 Meeting Information Usually last Sunday (February, May, August and November) at 1330 hours, listen to Sunday Net or visit website for details.  
 Web www.zl1is.info

**82 Southern Wairarapa Amateur Radio Club**

Branch Call-sign In Recess

**83 Raglan Amateur Radio Club**

Branch Call-sign ZL1CCT  
Physical Address 46 Holland Rd, Fairfield, Hamilton 3214  
Postal Address c/- 46 Holland Rd, Fairfield, Hamilton 3214  
President Brian Farrell ZL1HN  
Secretary David Browne ZL1AT  
Treasurer David Browne ZL1AT  
Net Information Saturdays 3608 kHz at 0830 hours  
Contact Persons Brian Farrell ZL1HN, David Browne ZL1AT  
Contact Phone No ZL1HN (07) 843-4847 or ZL1AT (07)853-6008  
Contact Email bluebell@clear.net.nz  
Meeting Information As advised on weekly net  
General Information D-STAR Repeater on 145.350MHz -split,  
FM Repeater use CTCSS tone 1,2,3. UHF Repeater  
439.425MHz -split use CTCSS tone 1,2,3.

**84 Bay of Islands Amateur Radio Club (Inc)**

Branch Call-sign ZL1BOI  
Physical Address 6 Newton Watts Dr, RD1, Kerikeri 0294  
Postal Address 6 Newton Watts Dr, RD1, Kerikeri 0294  
President Mike Burch ZL2AUJ  
Vice President D. Cottle ZL1HH  
Secretary G. Hunt ZL1ANH  
Treasurer G. Hunt ZL1ANH  
Contact Persons Nick Wallace ZL1IU  
Contact Phone No Nick Wallace (09) 401-9042 or  
Graeme Hunt (09) 407-1305  
Contact Email graemeh@xtra.co.nz  
Meeting Information Meetings held as required  
Web http://www.qsl.net/zl1boi

**85 Mercury Bay (Inc)**

Branch Call-sign ZL1MBB  
Postal Address C/- The Secretary, 80 Nelson St., Howick, Auckland  
2014  
President Ross Walker ZL1AAF  
Vice President Leith Jackson ZL1BCJ  
Secretary Murray McGehan ZL1DOM  
Treasurer Graeme Sherrard ZL1GK  
Net Information As required. On 7075 Mercury Bay  
Contact Persons Ross Walker ZL1AAF  
Contact Phone No 07-8665681 or (027) 495-5879  
Meeting Information Meeting information: Due to the vast spread of  
our members general meetings will be held on air  
monthly or when required and an AGM will be held  
on a convenient day during the main summer holiday  
break that will bring the largest presence possible.  
Committee Meeting As above  
General Information 7075 VHF repeater (Mercury Bay) Trusteeship of  
6975 repeater (Tairua) in conjunction with Waikato  
VHF Group. National System repeater 434.800 MHz  
from Opito Bay

**86 Musick Point Radio Group Incorporated**

Branch Call-sign ZL1ZLD and ZL1ZLF  
Physical Address Musick Memorial Radio Station,  
20 Musick Point Road, Bucklands Beach, Auckland  
Postal Address C/- PO Box 163-060, Lynfield, Auckland 1443  
President Chairman David Morey ZL1DAM  
Secretary Ann Walker ZL1BFB  
Treasurer Barbara Shephard ZL1UFT  
Contact Persons Ann Walker ZL1BFB  
Contact Phone No Bus (09) 923-6704, AH (09) 626-7188  
Contact Email zl1bfb@xtra.co.nz  
Meeting Information Second Sunday of each month 1300 hours at Musick  
Point Memorial Radio Station. Midweek group each  
Wednesday at 1000 to 1430 hours.  
Web http://www.nzart.org.nz/assets/branches/sarc/index.  
htm

**87 South Taranaki Amateur Radio Club (Inc)**

Branch Call-sign ZL2QF  
Physical Address Storage 4 U, Union St., Hawera  
Postal Address PO Box 156, Hawera 4640  
President Gary Legge ZL2GLM  
Secretary Graeme Bateman ZL2BHD  
Treasurer Michael Mulholland ZL2WJM  
Net Information 705 repeater on Sundays 2000 hours  
Contact Persons Graeme Bateman ZL2BHD  
Contact Phone No (06) 278 4793  
Contact Email gfbateman@clear.net.nz  
Meeting Information 4th Monday of each month (except January) at 1930  
hours at the Club rooms – Storage 411.  
Some meetings are held at alternative venues, check  
with secretary.  
Web http://www.qsl.net/ZL2QF

**88 Tauranga Emergency Communications Group**

Branch Call-sign ZL1TEC  
Physical Address Emergency Management Office, WBOPDC,  
Barkes Corner, Tauranga 3112  
Postal Address c/o Merriman Place, Veda Glen, Tauranga 3112  
President Brian Heywood ZL1IE  
Vice President Don Spackman ZL1MK  
Secretary interim Brian Heywood ZL1IE  
Treasurer Bill Richardson ZL1APD  
Net Information Tauranga 680 repeater, Wednesdays at 2030 hours  
(combined branches net)  
Contact Persons Brian Heywood ZL1IE  
Contact Phone No (07) 543-3677  
Contact Email brian@eol.co.nz  
Meeting Information Third Thursday of the month, except December, 1930  
hours at the clubrooms, EMO Office, Barkes Corner.  
Combined with Branch Meeting  
Committee Meeting

**89 Radio Electronics Group (Inc)**

Branch Call-sign ZL1REG and ZL2REG  
Physical Address 211 Peacocks Road, Glenview, HAMILTON  
Postal Address c/o P.O.Box 8041, HAMILTON  
President Steve Alderson ZL1SAD  
Secretary Trevor Service ZL4GJ  
Treasurer Trevor Service ZL4GJ  
Net Information VHF Sundays: 7.30pm. on the Waitomo rpt.  
147.375MHz(+600kHz) HF Thursdays: 2000hrs.  
3615kHz LSB  
John Lisignoli ZL1PO or Trevor Service ZL4GJ  
Contact Persons (07) 855-5912 or (07) 843-7365  
Contact Phone No zl1po@nzart.org.nz or trev99@xtra.co.nz  
Contact Email General Monthly Meetings are held at the clubrooms,  
1pm on the second Saturday of the month (except  
January) starting off with a 'Pot Luck' BBQ lunch.  
Club Repeater:438.875 (-5Mhz) No tone required.  
http://groups.yahoo.com/group/ZL1REG/  
Web We welcome and encourage all HAMS plus people  
involved with CB radio,PRS radio,Radio Scanners  
and Short Wave radio.Our annual new and used  
equipment sale is on the second Saturday of May  
held at the clubrooms.

**Affiliated Canterbury Amateur Radio Development Society (Inc).  
(CARDS)**

Branch Call-sign ZL3CAR  
Postal Address PO Box 21-188, Edgeware, Christchurch 8030  
President Mike Stubberfield ZL3MJS  
Vice President Mike Barnes ZL3TMB  
Secretary Ivan van Hoof ZL3TIV  
Treasurer Mark Sullivan ZL3AB  
Contact Persons Lorna Allan ZL3AAZ  
Contact Phone No (03) 313-5352  
Contact Email lorna.allan@getrheel.co.nz  
Meeting Information Third Wednesday of each month  
(except January) 1930 hours at the Branch  
56 Clubrooms, Auburn Park, Christchurch



## A Responsibility for all Radio Amateurs!

The amateur radio qualification is an achievable challenge for most people and is useful to career seekers in our technological world. It shows aptitude, a sincere interest in communications, and identifies an achiever. Which can give a jump over others in this competitive world. The late 1940s was a time with a wave of new entrants into amateur radio. Let us all try to promote a return to that level of interest! The NZART Council encourages newcomers into Amateur Radio. This calls for the help of all radio amateurs. As a challenge to all of us, the NZART Council has adopted the expression, "The New Wave", to embrace initiatives and objectives which will encourage new entrants to the world of amateur radio.

The NZART Constitution in its object statement says: "The objects of the Association shall be the maintenance and expansion of the Amateur Service in New Zealand by:

- a) the encouragement of recruits into the Amateur Radio movement
- b) the provision of guidance and instruction in radio techniques and operating

c) the promotion organisation and conduct of activities on a national and local basis ...", These objects are further reflected in wording in the NZART Strategic Plan, in particular Objective 2, which states:

- To promote knowledge of amateur radio and encourage newcomers.
- To assist Branches in local activities, especially in schools.
- To provide education and training aids.
- To award suitable prizes and other recognition."

And, in the plans of action:

"To publish information in Break-In, training materials and aids, educational and publicity material."

The NZART Strategic Plan Objective 3 states: "To provide guidance and instruction in radio techniques and operating, and encourage practical experimentation."

With your guidance and your help, others too can experience the thrills of Amateur Radio. Active encouragement and support are sought from all NZART members and Branches to recruit newcomers and to

run classes in preparation for the amateur radio examination. Branches are encouraged to actively promote Amateur Radio. Master copies of brochures, posters and other leaflets and publicity material are available to Branches free of charge, from NZART Headquarters.

A sticker is available to NZART members from NZART Headquarters for 50c each. This is for displaying in the rear window of vehicles to show your support in a national campaign to increase the awareness of Amateur Radio in the general population. Many computer users are unaware of amateur radio and what it has to offer. You are encouraged to widely advertise the NZART World Wide Web page, <<http://www.nzart.org.nz>>

Simple-to-construct equipment is a way to show youth groups and other interested persons the fun of Amateur Radio. Show how inexpensive home-construction brings delight and excitement from the achievement of communicating without wires over long distances using self-built gear. Articles from Break-In may be freely photocopied and distributed for this purpose. Do

you know anyone who has shown interest in Amateur Radio? A youth or grandchild perhaps? Spread the word by demonstration! After passing the amateur radio examination, a call-sign that is unique world-wide is issued by the Ministry of Economic Development. The challenge to attain such an identifying call-sign brings its own rewarding fun. A local "group project", with the challenge to interest newcomers to develop their own local on-air amateur radio net, is worthy of consideration and encouragement. Construction of receivers, transmitters and other projects under the guidance of experienced constructors at "club workshop nights" is a worthy Branch activity. Each Branch should appoint an "NZART Agent" as one of their executive, the task being to gain increases in NZART members, both Transmitting and Non-Transmitting, in their local areas. A national and concerted effort by all New Zealand Radio Amateurs to promote Amateur Radio is necessary to ensure the continuation of a healthy and vigorous Amateur Service. Help bring the "The New Wave" of radio amateurs!

# THE PROMOTION OF AMATEUR RADIO

## Your work promoting AMATEUR RADIO is helped with this new STUDY GUIDE and sample TEST PAPERS

To help interested people become radio amateurs a **Study Guide** and sample **Test Papers** for the New Zealand Amateur Radio Examination are available:

1. The Guide and the Test Papers can be downloaded in separate self-extracting files for installation on your own computer. Installation details

are on the web page <<http://www.nzart.org.nz/exam/download-examination-files/>>. Downloading is recommended, so these documents can be used at any time.

- 2 The Guide and the Test Papers can also be viewed and used on-line – by anyone. Visit the NZART web page: <[http://](http://www.nzart.org.nz/assets/exam/Sg/Sg-intro.html)

[www.nzart.org.nz/assets/exam/Sg/Sg-intro.html](http://www.nzart.org.nz/assets/exam/Sg/Sg-intro.html)> and follow the links.

### Please Note:

1. These documents can be used as a source of hand-out notes for Instructors at Radio Classes. "Copy and paste" can be used to copy material

into a word processor then photocopied for class use, or whole pages can be printed off.

2. The Guide is NOT a replacement for the NZART Basic Radio Training Manual. The two support and complement each other.

# New Zealand Amateur Radio Stations Personal Call-signs as at 10 September 2012

Radio Spectrum Management (RSM) in the Ministry of Business, Innovation, and Employment have provided the following call sign information from SMART, the Register of Radio Frequencies.

RSM and NZART have tried to provide as accurate a call-sign list as possible.

If your record does not display what you were expecting, this will probably be because your details in SMART contain incorrect or incomplete information.

You can update your details online by logging on to SMART at [www.rsm.govt.nz/smart](http://www.rsm.govt.nz/smart). If you do not have a logon please contact RSM.

Alternatively, you can contact RSM on free phone 0508 RSM INFO (0508 776 463) or email [info@rsm.govt.nz](mailto:info@rsm.govt.nz).

After logging on

> Click the 'Logon Details' menu

> Select 'Change your Client Details'.

From here you can change basic information, including your email.

Addresses should be filled in as follows:

Address type	Address Residential/Physical	Address Billing/Postal
Address 1:	Street address	PO Box or Street Address
Address 2:	Town/suburb	Suburb
Address 3:	City/Region	City/Region
Address 4:	City	City
Area Code:	Post Code	Post Code

Note: SMART will not accept a PO Box number as a Residential/Physical address.

It may not be necessary to complete all address fields, however, the most specific address should go to Address 1.

Please check your post code at <http://www.nzpost.co.nz/tools/address-postcode-finder>. NZ POST has recently updated their postcode finder, it is now very user friendly.

If your Callsign is missing from the Callbook, first check that it is in SMART. If your Callsign shows as "RSM Reserved" then RSM were unable to contact you to confirm your address details were correct. If this is the case, advise RSM of your details by emailing [rsmlicensing@med.govt.nz](mailto:rsmlicensing@med.govt.nz) or Freephone 0508 RSM INFO (RSM 776 463).

Please note that it would be appreciated if text could be entered with only first letters capitalised. It makes the Call-Book Editor and typesetter's work much easier.

For Silent Keys, there is a form available at <http://www.nzart.org.nz/council/policies/2006-remove-client-record/> which is shown on the following page.

This can be filled in and posted to the NZART Business Manager at HQ (PO Box 40-525 Upper Hutt 5140) with relevant supporting documentation by a person authorised to do so.

Note: It is recommended that Amateurs leave a signed copy of the filled out form with their will, thus removing another job that the next of kin are required to do.

For further information, please see the help files at <http://www.nzart.org.nz/h-quarter/call-book-list/#cblh>.

The New Zealand Association of Radio Transmitters Incorporated  
PO Box 40-525 Upper Hutt



## Application to remove a Client Record from the Radio Spectrum Management Register

The Radio Spectrum Management Database is a Government register established and maintained under the Radiocommunications Act 1989. A call-sign cannot be removed from the register, or given to a family member who is qualified to hold the call-sign, unless the ARX at NZART receives a direct instruction from a person with authority to make the request.

Please fill in as much of this form as is known and return to NZART at the above address.

I, the undersigned, instruct NZART to action the following call-sign(s) and information in the MED database:

Name: \_\_\_\_\_

Address: \_\_\_\_\_

City: \_\_\_\_\_

Date of Birth: \_\_\_\_\_

Call-sign(s): \_\_\_\_\_

Reason for Application: \_\_\_\_\_

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

Options: (Please cross out the option that does not apply)

1. I instruct NZART to remove the call-sign(s) \_\_\_\_\_ from the MED Register. I understand that the call-sign(s) will not be reallocated for a period of 12 months unless I make a direct request for the call-sign(s) to be reallocated to a specific person within this period.
2. I instruct NZART to remove the call-sign(s) \_\_\_\_\_ from the MED Register. I give my permission to allocate the following call-sign(s) to the following qualified person/people/organisation.

Call-sign Person/Organisation \_\_\_\_\_

\_\_\_\_\_  
\_\_\_\_\_

NZART Membership: Please remove the above person from NZART Membership:

NZART Membership Number \_\_\_\_\_ (If Known)

1. Now: (Break-In delivery will cease ASAP)
2. At the end paid subscription: (Break-In will continue until the subscription expires)

(Please cross out option that does not apply.)

Name: \_\_\_\_\_ Signature: \_\_\_\_\_

Relationship to client: Next of Kin / Power of attorney / Executor in Estate / Solicitor acting for Executor

20091117

<b>ZL1AA</b>	NZART Auckland Branch Inc	PO Box 18-003, Glen Innes, Auckland	<b>ZL1ADS</b>	Mr W J Tibbles	19 Kotanui Avenue, Army Bay, Whangaparaoa 0930
<b>ZL1AAA</b>	Mr B D Gordon	11 Siota Cres, Kohimarama, Auckland	<b>ZL1ADT</b>	Dr K R Orr	PO Box 95-151, Swanson, Auckland 0653
<b>ZL1AAB</b>	Mr D J Cardy	36 Balmaln Rd, Birkenhead, Auckland 0626	<b>ZL1ADW</b>	Mr B E Clark	88 Lincoln Park Ave, Massey
<b>ZL1AAE</b>	Mr J K Yearsley	Boat Harbour Rd, RD 1, Whitianga	<b>ZL1AE</b>	Mr Ethan Browne	46 Holland Road, Fairfield, Hamilton 3214
<b>ZL1AAF</b>	Mr R L Walker	128 Buffalo Beach Rd, Whitianga	<b>ZL1AEL</b>	Mr Jack Stanley	PO Box 525, Whangarei 0140
<b>ZL1AAH</b>	Mr Rick Backhouse	17 Dale Road, Kellsy Bay, RD 1, Te Kopuru 0356 0391	<b>ZL1AES</b>	Mr Adrian Skipper	624 Whangaparaoa Road, Stanmore Bay, Hibiscus Coast
<b>ZL1AAI</b>	Mr J W de Jong	28a Richmal Street, Waihi 2981, Waikato	<b>ZL1AET</b>	Mr A E Tse	PO Box 99977, Newmarket, Auckland 1149
<b>ZL1AAJ</b>	Mr H J Williams	30 Halberg St, Glenfield, Auckland 1310	<b>ZL1AF</b>	Mr I W Ogier	32 Rangitane St, Palmerston North 4414
<b>ZL1AAK</b>	Mr C H L Stephens	56 Karaka St, Takapuna 0622	<b>ZL1AFB</b>	Mr J L Offord	43 Queens Rd, New Plymouth
<b>ZL1AAL</b>	Mr A J Carruthers	9a Cockle Bay Road, Howick	<b>ZL1AFF</b>	Mr J Fleming	43 Burns St, Leamington
<b>ZL1AAM</b>	Mr Peter Scott	25 Chatsworth Cres, Pakuranga, Auckland 2010	<b>ZL1AFG</b>	Achmat Mohamed	129 Wayne Francis Drive, Dannemora, Auckland 2016
<b>ZL1AAN</b>	Mr H T Falkner	8 Kapai St, Devonport	<b>ZL1AFM</b>	Mr P R Bellamy	36 Eton Rd, Hillsborough
<b>ZL1AAO</b>	Mr L B Steel	86 Bennett Road, Te Mata, RD 5, Thames 3575	<b>ZL1AFN</b>	Barry Outfield	28 Ocean Road, Ohope 3121
<b>ZL1AAP</b>	Mrs A A Pope	Address Withheld	<b>ZL1AFO</b>	Mr Gerald Rogers	PO Box 79, Kaitia
<b>ZL1AAQ</b>	Mr W J Palmer	27 Thomas Street, Tikipunga, Whangarei 0101	<b>ZL1AFQ</b>	Mr D A R Rosan	182 Gills Road, Albany Heights, Auckland 0632
<b>ZL1AAR</b>	Mr R G Rowe	32 Manawa Rd, Remuera 1050	<b>ZL1AFS</b>	Mr T C Maurice	850 Beach Rd, Waiake, Auckland 0630
<b>ZL1AAS</b>	Mr A Scott	25a Rodney St, Howick, Auckland	<b>ZL1AFT</b>	Cowley	45 Apotu Road, RD 1, Kamo Whangarei
<b>ZL1AAU</b>	Mr C B Elley	Unit 11, Waihi Hosp Retirement Village, Village Way, Waihi	<b>ZL1AFU</b>	Mr R J Murphy	19 Litten Rd, Howick, Auckland 2014
<b>ZL1AB</b>	North Shore Branch 29 NZART	C/- North Shore Civil Defence HQ, 400 East Coast Road, Sunnynook, Auckland 0630	<b>ZL1AFV</b>	Mr A R Boyce	26 Shakespeare St, Cambridge 3432
<b>ZL1ABA</b>	James Murray	15a Milton Road, Orewa, Auckland 0946	<b>ZL1AFX</b>	Mr M R Kilsby	PO Box 733, Kununurra, WA 6743, Australia
<b>ZL1ABC</b>	Mr R R Biddle	C/O Wesley College, PO Box 58, Pukekohe 1800	<b>ZL1AFY</b>	Mr P J Coleman	2a Kohe St, Riverside, Whangarei
<b>ZL1ABCD</b>	Auckland Contest Club (ACC)	C/- Jacques Calvo, 31 Raurenga Ave, Epsom, Auckland	<b>ZL1AFZ</b>	Mr J P McLean	Gorge Rd, RD 3, Pahiatua
<b>ZL1ABG</b>	Mrs B Garlick	14/1 Cambria Street, Nelson	<b>ZL1AG</b>	Mr A K Giles-Pain	Address Withheld
<b>ZL1ABI</b>	Mr Herbert Baer	51/8 Fynn Street, Birkdale, Auckland 0632	<b>ZL1AGA</b>	Mr J W Rasmussen	65 Smith St, Matamata
<b>ZL1ABL</b>	Mr Alan J Dale	61 Rodney St, Wellsford, Auckland 0900	<b>ZL1AGC</b>	Mr K M Passau	PO Box 444, Drury, Auckland
<b>ZL1ABN</b>	Mr M J F Reay	16 Priscilla Cres, Hamilton	<b>ZL1AGG</b>	Mr P E Bycroft	253 Shirley Rd, Papatoetoe, Auckland
<b>ZL1ABP</b>	Mr K L Rutter	55 Ellis Avenue, Mt Roskill, Auckland 1004	<b>ZL1AGK</b>	Mr Bruce Clarke	59 Blackwell Drive, Tryphena, Great Barrier Island, Auckland 0991
<b>ZL1ABR</b>	Mr B J Ward	44 Cordylone Road, RD 5 Tuakau, Port Waikato	<b>ZL1AGL</b>	Mrs Y H de Gruyter	54 Maraetai Heights Road, Maraetai, Auckland
<b>ZL1ABS</b>	Mr Michael J Sheffield	176 Albany Highway, Albany, Auckland 0632	<b>ZL1AGM</b>	Mr A G Meharry	21 Suzanne Grove, Kelvin Grove, Palmerston North 4414
<b>ZL1ABW</b>	Allan White	10 Gifford Place, Utuhina, Rotorua 3015	<b>ZL1AGN</b>	Mr M H Campbell	Fencourt Rd, RD 1, Cambridge
<b>ZL1ABX</b>	Mr Julian Richard Dukes	102 Awaruku Rd, Torbay 0630	<b>ZL1AGP</b>	Mrs H Horwood	233 King St, Whakatane
<b>ZL1ABZ</b>	Mr I Johnson	15 Muirend Ave, Tokoroa	<b>ZL1AGR</b>	Mr J K Cotton	Villa 177 / Acacia Cove, 127 Wattle Farm Road, Wattle Downs Auckland 1702
<b>ZL1AC</b>	Western Suburbs Radio Club Inc	PO Box 15-122, New Lynn	<b>ZL1AGS</b>	Mr P E Collins	185 Victoria St, Cambridge
<b>ZL1ACE</b>	Mr S P Winder	138 Wellington St, Opatiki	<b>ZL1AGT</b>	Mr E R Taylor	18 The Circle, Whangaparaoa, Auckland 0930
<b>ZL1ACG</b>	Mr E G Caldwell	23 Cyima Place, Massey, Auckland 1008	<b>ZL1AGV</b>	Mr L N Dixon	18 Koru St, Mangere Bridge
<b>ZL1ACH</b>	Mr R J M Ten Velde	8 Matipo Place, Tokoroa	<b>ZL1AGW</b>	Mr D F McDonald	6 Margaret Place, RD 1, Whitianga 3591
<b>ZL1ACJ</b>	Mr R H Turner	7 Keiss Street, Blenheim	<b>ZL1AGY</b>	Mr J A Easton	Rd 9, Wheki Valley Hill, Whangarei
<b>ZL1ACK</b>	Mr R F Marshall	P O Box 41172, St Lukes, Auckland	<b>ZL1AGZ</b>	Mr J D Delaney	41 Birdwood Rd, Swanson
<b>ZL1ACM</b>	Mr C J McKenzie	108 Prices Road, Wiri, Manukau, Auckland 2025	<b>ZL1AH</b>	Mr J D Wightman	99c Eighth Ave, Tauranga
<b>ZL1ACN</b>	Mr D L Messent	53 Russell Road, Huntly	<b>ZL1AHD</b>	Mr M J Franklin	138 Barrett Road, RD3, Albany, Auckland
<b>ZL1ACS</b>	Ken Clarke Radio Club	585 Bedford Road North, Rd8, Inglewood 4388	<b>ZL1AHK</b>	Mr W Tester	48 Pulham Rd, Warkworth
<b>ZL1ACT</b>	Mr R N Miller	72 Grattan Rd, Te Aroha	<b>ZL1AHL</b>	Mr G L McLellan	19 Kinder Place, Ngongotaha, Rotorua
<b>ZL1ACV</b>	Mr D G L Twiss	PO Box 884, Taupo	<b>ZL1AHM</b>	Mr A D Bell	182 Ocean Rd, Ohope
<b>ZL1ACW</b>	Mr Anthony William	304a Shoalhaven, 130 Anzac Street, Takapuna, North Shore City 0620	<b>ZL1AHT</b>	Mr I D Buckland	268 Seaton Valley Road, Rd1, Upper Moutere, Nelson 7173
<b>ZL1ACX</b>	Mr Brian Rous	6 Governors Lane, Vision Lifestyle Village, Kerikeri 0230	<b>ZL1AHX</b>	Mr A M King	Unit 2/106 Victoria St, Onehunga, Auckland 6
<b>ZL1ACY</b>	Mr C J Billing	16 Dobell Rd, Stanmore Bay, Whangaparaoa 1463	<b>ZL1AHZ</b>	Mr B F Kidd	18 Addison Rd, Onerahi Rd1, Whangarei 0192
<b>ZL1ACZ</b>	Mr B C Williams	M3 66 Avonleigh Rd, Green Bay, Auckland	<b>ZL1AI</b>	Mr R G Badman	Villa 39, Lauriston Park, 91 Coleridge Street, Cambridge 3432
<b>ZL1AD</b>	Mr D J Blackett	56 Church St, Northcote, Auckland 9	<b>ZL1AIA</b>	Mrs M B Baylis	1 Munro St, Onerahi, Whangarei
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			<b>ZL1AJD</b>	Mr F J Krippner	Te Rore, RD 6, Te Awamutu
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ZK8EI	Manawatu	Len Inkpen	ZL2LI	(06) 357-1493	(027) 447-4034	Cheryl Weatley	ZL2VCC	(06) 326-8551	(027) 223-3677
ZK8EJ	Wairarapa	David Bray	ZL2BA	(06) 378-8288	(027) 669-7774	Gavin McNulty	ZL2VGB	(06) 377-3978	(027) 429-16105
ZK8EN	Nelson	Dave Scott	ZL2BCA	(03) 545-0237	(027) 446-4714	Brian Hawken	ZL2BJ	(03) 547-0382	(021) 230-9592
ZK8EO	Marlborough	Paul Rennie	ZL2RE	(03) 578-5311	(027) 458-9740	Ron Harris	ZL2BDD	(03) 575-7181	(021) 103-5143
ZK8ES	Horowhenua	Kenneth Ireland	ZL2KI	(027) 444-9449	(027) 444-9449	James Jones	ZL2USA	(06) 368-1122	(021) 763-939
ZK8ET	Titahi Bay	Brian Amies	ZL2AYF	(04) 232-6378					
ZK8EW	Marton	Brian Purdie	ZL2ADL	(06) 329-3606	(027) 321-4470	Jim Vernon	ZL2BHX	(06) 388-1855	(027) 446-2628
ZK9EA	Christchurch	Richard Smart	ZL4FZ	(03) 385-8355	(021) 443-086	Steve Davis	ZL2UCX	(03) 348-0360	(027) 436-1796
ZK9EB	Westland	Graham Hay	ZL3WMM	(03) 768-9499	(027) 560-6055	Kevin O'Sullivan	ZL3ABY	(03) 768-7598	(022) 638-4940
ZK9EC	Sth.Canterbury	Glenn May	ZL3GL	(03) 686-0306	(027) 433-5022	David Hetherington	ZL3UDH	(03) 688-3619	(027) 687-6787
ZK9ED	Ashburton	Jim Nelson	ZL3ND	(03) 318-5827	(027) 289-3833	Robin Williams	ZL3REW	(03) 308-8880	(027) 405-0105
ZK9EG	Nth.Canterbury	Don MacDonald	ZL3DMC	(03) 327-7415	(027) 551-6683	Geoff Gillman	ZL3QR	(03) 313-7137	(027) 647-5490
ZK4EA	Otago	Lindsey Ross	ZL4KS	(03) 487-8946	(021) 116-1686	David Stevenson	ZL4SB	(03) 454-2527	(027) 435-7307
ZK4EB	E. Southland	Lindsay Eunson	ZL4LC	(03) 206-4587	(027) 432-5136	Murray Giles	ZL4MG	(03) 208-6803	(027) 508-1577
ZK4EC	Southland	Daniel Erickson	ZL4DE	(03) 215-6908	(027) 825-4989	Mike Bailey	ZL4OM	(03) 217-313	(027) 344-6851
ZL4ED	Balclutha	John Blair	ZL4AM	(03) 415-7849	(027) 284-4283	Russell Bennett	ZL3GM	(03) 417-7411	
ZK4EE	Centr.Otago	John Lochhead	ZL4QS						
ZK4EF	North Otago	Neil McLeod	ZL4SN	(03) 434-7253	(027) 334-7759	Gary Millar	ZL4TA	(03) 434-5993	(03) 434-5029

AREC records have been updated from the National Database. Any additions or omissions to AREC Secretary, P.O. Box 44-132, Pt Chevalier, Auckland  
This is a list of active AREC sections based on 'Activity Reports' received by the AREC Secretary over a 18 month period. Correct as at August 2012



The IARU Monitoring Service (MS), a global organisation, was formed in Geneva in 1985. It comprises three regional MS, with New Zealand being in region 3. In turn the regional MS are made up from the national societies' MS, such as the NZART MS, with national co-ordinators and other volunteers who assist in reporting, identifying and dealing with non-amateur interference on the amateur bands. This structure provides a mechanism through which ordinary radio amateurs in any country can identify and report harmful interference on the amateur bands and, where necessary, escalate things to the regional or international bodies and various regulatory authorities for concerted action. The radio frequency spectrum is a limited, shared resource that is constantly under pressure from multiple users, not all of whom respect the rights of radio amateurs. It is clearly in our interests to protect the amateur frequencies allocated for our use. With the increasing demands for spectrum space and the tendency of some administrations to ignore their responsibilities under the ITU convention, the amateur service *must* maintain a strong and effective MS if it is to retain its frequency allocations. It is vital that we continue to present factual, authoritative information about intruders to the authorities, and proactively defend our rights. The cooperative, global nature of the IARU MS provides us with a more powerful voice.

### Intruders

An intruder is any non-amateur



*Courtesy of BBC Monitoring "A History of Caversham Park."*

radio transmission in the exclusive amateur bands. Note that not all amateur bands are exclusively allocated to us: we have access to some on a primary or secondary basis alongside other users with mutual non-interference obligations, and the allocations vary globally. Some intruders are unlicensed pirates. Some administrations claim the right to use any frequency they like including the amateur bands – some (such as North Korea) are non members of the ITU, while a few casually ignore certain ITU regulations at their convenience. Some do not even appreciate that they are causing harmful interference by spurious or harmonic radiation, and that is where the MS can help by bringing the problem to their notice.

Radio was a more elusive medium to track and be sure what was being said and in what tone.

### Harmful interference

Harmful interference is that which seriously degrades obstructs or repeatedly interrupts a radiocommunication service, such as the Amateur Service, operating in accordance with the ITU Radio Regulations. Harmful interference is classed as either out-of-band or spurious emissions:

- **Out-of-band emissions** are emissions on a frequency or frequencies which are outside the necessary bandwidth, which result from the modulation process. Their choice of frequency is normally deliberate and intentional;
- **Spurious emissions** are emissions outside the necessary bandwidth, the level of which may be reduced without affecting the corresponding transmission of information. Spurious emissions include harmonics, parasitics, intermodulation products ("intermod") and frequency conversion products. These are normally accidental or unintentional transmissions. Whether or not they fall within permitted technical limits (*e.g.* harmonics so many decibels down from the fundamental), they may still interfere with amateur transmissions.

The growth of digital computing, networking and telecommunications equipment

is causing severe interference problems for many radio amateurs. Some of the worst offenders are PCs, plasma screens, WiFi routers and switch mode power supplies (not least those in many amateur households!) which tend to cause relatively localised problems that can sometimes be reduced using suitable ferrite cores, by increasing the distance between antennas and nearby buildings, or by replacing offending items with quieter/better screened equipment. Experimental technologies such as "Broadband over Power Lines" (BPL) have the potential to wipe out entire HF bands over wider areas, while collectively such wideband interference sources are raising the noise floor for us all. This insidious threat is of great concern to NZART MS and our colleagues abroad, especially since many amateurs rely on relatively low power transmissions and hence weak signals over difficult paths that seldom concern other radiocommunication services. With the advent of Software Derived Receivers (SDR), a new world of hearing and seeing is occurring, harmful interference such as HF Man Packs are regularly being seen and identified across the HF bands in particular.

### Reporting

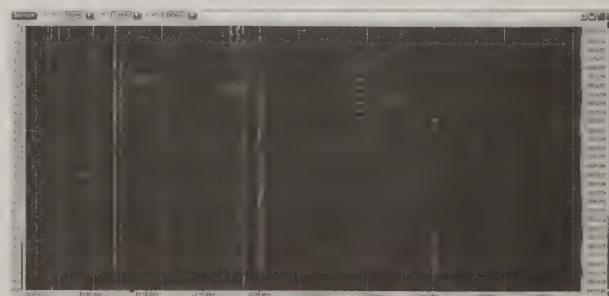
The most direct way for ZL amateurs and SWLs to report amateur band intruders is by email (our contact details are given below). When reporting, please provide as much information as possible to help us characterise the intruder, namely:

- The **spot frequency or frequency range** over which interference was caused, as accurately as you can;
- The **date and time or time**

**period** in which it occurred, in UTC please;

- The nature of the interfering signal, ideally stating the **mode or type of emission** using the official designations but if not some indication such as Over The Horizon Radar (OTHR), Coastal Ocean Dynamics Applications Radar (CODAR), USB/LSB, AM, FM or digital modes (note: to help you identify obscure signals, there are several audio samples on the NZART MS Web page at <http://www.nzart.org.nz/ms> plus links to additional helpful Web resources elsewhere).
- Any **station call-sign or identification** transmitted by the intruder (hint: listen out for jingles and station IDs transmitted at the top of the hour by most commercial broadcasters);
- **Other helpful remarks** such as any traffic or text transmitted, the length of transmissions or how often the transmissions have been heard, type of music or background noises, languages spoken, peak direction (azimuth) from your Maidenhead locator or town, approximate signal strength etc.;
- If you have the opportunity, please also attach an **audio sample** as an MP3 or WAV file, and/or an audio spectrum "waterfall" image: these provide invaluable supporting evidence.

On receipt of an intruder report, the NZART MS voluntary observers, in conjunction with our colleagues in ZL, VK, IARU Region 3 and sometimes further afield, will further analyse the information, for example to determine the specific type/mode of transmission or language used. If reports are received promptly, we usually check to find out whether we can also hear the same intrusion (indicating



*HF Man Packs via an Software Derived Receiver*



*Broadcast reception in the Listening Room  
"History of Caversham Park."*

a widespread problem) or not (possibly a localised or short term interference source). Collating and comparing intruder reports from many reports increases the probability of being able to identify the sources. Using direction finding techniques, for example, we may be able to tell the approximate or actual source locations (more below). We always try to provide feedback to reporters, for instance confirming whether this is a known intruder that we are already dealing with, or a newcomer that needs further work. Intruder reports from ZL feed our regular consolidated reporting to IARU Region 3 MS and are disseminated in turn to the other two regions.

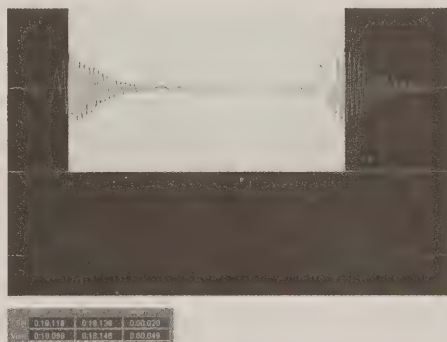
Broadcast monitoring reception from the BBC Caversham listening room

### Direction Finding

Direction finding involves identifying the locations from which signals are transmitted. At least two contemporaneous reports on the same signal are normally required to triangulate signals on the HF bands: one may be your own station while others may belong to other MS volunteers or even Web-accessible Software Defined Radios (SDRs) such as <http://websdr.ewi.utwente.nl:8901/> or <http://www.websdr.org/>. You may be able to help us without even owning a receiver or antenna, for example finding out whether there is propagation to our part of the globe at that time from the area where we suspect an intruder might be located.

If you have some sort of rotatable beam antenna, the intruder normally lies somewhere along the great circle direction that gives the maximum signal strength. If you have a rotatable dipole, nulls off both ends of the

dipole can be used to indicate two approximate directions by turning the antenna until the signal dips out. Under certain circumstances, intruders may even be located by accurately timing pulses received simultaneously over both short and long paths (this is where audio recordings of repetitive pulse radar systems can prove useful). As a last resort, simply reporting what other parts of the world you could hear at that time, or the language used, gives a very rough indication of the possible location of an intruder. You never know, someone else may be able



*Measuring OTHR Pulses with an Audio Analyser*

to corroborate your report and so fill-in the missing information.

### Reporting Local Intruders to the Radio Spectrum Management

Any one can report an intruder, suspected pirate or interference to the Radio Spectrum Manager group via the procedure outlined in [http://www.rsm.govt.nz/cms/consumers/copy\\_of\\_reception-problems/how-can-i-register-an-interference-complaint](http://www.rsm.govt.nz/cms/consumers/copy_of_reception-problems/how-can-i-register-an-interference-complaint). However, in the majority of cases, direct liaison with the miscreant normally solves the issue with assistance from the

NZART officers or club members. However, in order to save the RSM group a great deal of time and effort in terms of conducting an investigation, the NZART MS Co-ordinators collate the required information and verify its authenticity before submitting it. We are then prepared to answer any questions the RSM Inspector or Manager may ask with respect to our submission. This approach has worked very successfully within New Zealand.

### Reporting International Intruders to the IARUMS Region 3 Co-ordinator

The MS Co-ordinators collate the required information and verify its authenticity before submission an intruder report to the IARUM MS Co-ordinator for Region 3 (Peter - VK3MV). He then collates the information and verifies the information received from other Region 3 reports before making a formal submission to the responsible Telecommunication Authority (TA) as a formal complaint. The procedure used by the Wireless Institute of Australia is: <http://www.wia.org.au/members/intruder/about/>

Details on how to contact

who, for whatever reason, cause interference on the exclusive amateur bands. A vast amount of work by many dedicated individuals and groups over many decades has gone into making the amateur service what it is today. We, the present generation of radio amateurs, have a responsibility to help keep it that way for ourselves and future generations. One of the most important ways we can do this is to report intruders into our exclusive bands. The longer we ignore them, the harder it will be to remove them. Do nothing and we may gradually lose the right, not just the ability, to use the amateur bands due to intrusions. Please report intruders as soon as possible after you log them, using email if possible as that allows us to act quickly. You can email the NZART MS co-ordinator or deputy directly, or send a message to one of the general ZL amateur email reflectors (such as KiwiDX or ZLhams) but it is better to submit reports to the email reflector set up for this specific purpose, namely [IntruderWatch@GoogleGroups.com](mailto:IntruderWatch@GoogleGroups.com). You are very welcome to join the Intruder Watch group - visit <http://groups.google.com/group/IntruderWatch> to apply - and help us by reporting and/or characterising intruders.

If you don't have access to email, please submit your reports to either of us by telephone or even by post:

### NZART Monitoring Service Co-ordinator

John Martin ZLIGWE  
57 Crescent Road East  
Palm Beach, Waiheke Island  
Auckland 1081

Telephone: 09 372 7878 (home),  
09 397 8634 (work), 021 744 012  
(mobile/SMS text)

E-mail: [MS@NZART.org.nz](mailto:MS@NZART.org.nz) or  
[John.Martin@NZ.IBM.com](mailto:John.Martin@NZ.IBM.com) or  
[jrmvk8jr@extra.co.nz](mailto:jrmvk8jr@extra.co.nz)

### NZART Monitoring Service Deputy Co-ordinator

Dr Gary Hinson ZL2IFB  
Castle Peak, 1262 Taihape Road  
RD9 Hastings 4179

Telephone: 06 874 3344  
E-mail: [MS2@NZART.org.nz](mailto:MS2@NZART.org.nz) or  
[Gary@G4iFB.com](mailto:Gary@G4iFB.com)

the IARUMS R3 Regional MS Coordinator are available via the NZART Monitoring Service web links: <http://http://www.nzart.org.nz/ms/index.html>

### How to contact us

NZART Monitoring Service relies heavily on your reports. We do not handle complaints by amateurs against other amateurs, which are for the National Society or the NZ radio authorities to deal with. However, we do deal with pirates, commercial broadcasters and other non amateur intruders



# ITU CLASSES OF EMISSION CODE

The basic characteristics of radio emissions are usually given in a three symbol group, such as A1A for Morse code.

These symbols are arrived at as follows:

First symbol—type of modulation of the main carrier.

Second symbol—nature of signal(s) modulating the main carrier.

Third symbol—type of information to be transmitted.

Modulation used only for short periods and incidental purposes, such as identification, may be ignored.

## 1. First symbol—type of modulation of main carrier

- |         |  |   |
|---------|--|---|
| 1.1     | Emission of an unmodulated carrier   | N |
| 1.2     | Emission in which the main carrier is amplitude modulated, including angle-modulated sub-carriers—                                 |   |
| 1.2.1   | Double-sideband  | A |
| 1.2.2   | Single-sideband, full carrier  | H |
| 1.2.3   | Single-sideband, reduced or variable carrier   | R |
| 1.2.4   | Single-sideband, suppressed carrier  | J |
| 1.2.5   | Independent sidebands  | B |
| 1.2.6   | Vestigial sideband   | C |
| 1.3     | Emission in which the main carrier is angle-modulated—   |   |
| 1.3.1   | Frequency modulation   | F |
| 1.3.2   | Phase modulation   | G |
| 1.4     | Emission in which the main carrier is amplitude and angle-modulated either simultaneously or in a pre-established sequence         | D |
| 1.5     | Emission of pulses—  |   |
| 1.5.1   | Sequence of unmodulated pulses   | P |
| 1.5.2   | A sequence of pulses—  |   |
| 1.5.2.1 | Modulated in amplitude   | K |
| 1.5.2.2 | Modulated in width/duration  | L |
| 1.5.2.3 | Modulated in position/phase  | M |
| 1.5.2.4 | In which the carrier is angle-modulated during the period of the pulse   | Q |
| 1.5.2.5 | Combination of the above   | V |
| 1.6     | Cases not covered above in which an emission consists of the main carrier modulated in a combination of angle, amplitude, or pulse | W |
| 1.7     | Cases not otherwise covered  | X |

## 2. Second symbol: nature of signals modulating the main carrier—

- |     |  |   |
|-----|--|---|
| 2.1 | No modulating signal   | 0 |
| 2.2 | A single channel containing quantized or digital information, without the use of modulating sub-carrier* | 1 |
| 2.3 | A single channel containing quantized or digital information, with the use of a modulating sub-carrier*  | 2 |
| 2.4 | Single channel containing analogue information   | 3 |
| 2.5 | Two or more channels containing quantized or digital information   | 7 |
| 2.6 | Two or more channels containing analogue info  | 8 |
| 2.7 | Composite system with quantized or digital information together with analogue information                | 9 |
| 2.8 | Cases not otherwise covered  | X |

\*This excludes time-division multiplex.

## 3. Third symbol—type of information to be transmitted

- |     |   |   |
|-----|---|---|
| 3.1 | No information transmitted                | N |
| 3.2 | Telegraphy—for aural reception            | A |
| 3.3 | Telegraphy—for automatic reception        | B |
| 3.4 | Facsimile                                 | C |
| 3.5 | Data transmission, telemetry, telecommand | D |
| 3.6 | Telephony—including sound broadcasting    | E |
| 3.7 | Television (video)                        | F |
| 3.8 | Combination of above                      | W |
| 3.9 | Cases not otherwise covered               | X |

For a more complete description, the three symbol group may be preceded by a four symbol group representing the necessary bandwidth. This group must comprise three numerals and one letter, which must be H, K, M, or G. The letter is placed at the position of the decimal point in the number denoting the bandwidth in hertz, kilohertz, megahertz or gigahertz respectively.

The calculation of necessary bandwidths is complicated and only a few examples can be covered here. For CW Morse, the baud rate is 0.8 times the words per minute. The bandwidth is three or five times the baud rate, depending on the absence or presence of QSB. SSB Phone is just the highest modulating frequency. Double it for AM. FSK, RTTY (any code) is the baud rate plus 1.2 times the frequency shift. Optionally, two more symbols may be added to the basic characteristics of emissions.

The optional additional characteristics are:

Fourth symbol—details of signal(s).

Fifth symbol—nature of multiplexing.

## 1. Fourth symbol — details of signal(s)

- |      |  |   |
|------|--|---|
| 1.1  | Two-condition code with elements of differing numbers and/or durations                           | A |
| 1.2  | Two-condition code with elements of the same number and duration without error-correction        | B |
| 1.3  | Two-condition code with elements of the same number and duration with error-correction           | C |
| 1.4  | Four-condition code in which each condition represents a signal element (of one or more bits)    | D |
| 1.5  | Multi-condition code in which each condition represents a signal element (of one or more bits)   | E |
| 1.6  | Multi-condition code in which each condition or combination of conditions represents a character | F |
| 1.7  | Sound of broadcasting quality (mono)   | G |
| 1.8  | Sound of broadcasting quality (stereo)   | H |
| 1.9  | Sound of commercial quality (excluding categories K and L)                                       | J |
| 1.10 | Sound of commercial quality with the use of frequency inversion or band-splitting                | K |
| 1.11 | Sound of commercial quality with separate FM signals for level control                           | L |
| 1.12 | Monochrome television or facsimile   | M |
| 1.13 | Colour television or facsimile   | N |
| 1.14 | Combination of the above   | W |
| 1.15 | Cases not otherwise covered  | X |

## 2. Fifth symbol—nature of multiplexing

- |     |  |   |
|-----|--|---|
| 2.1 | None   | N |
| 2.2 | Code-division multiplex (including bandwidth expansion techniques) | C |
| 2.3 | Frequency-division multiplex                                       | F |
| 2.4 | Time-division multiplex  | T |
| 2.5 | Combination of F and T   | W |
| 2.6 | Other types of multiplexing  | X |

## Examples

25 wpm Morse on a local net:	060HA1AAN
25 wpm Morse on a DXpedition:	100HA1AAN
Classic HF Baudot RTTY:	1K07F1BBN
SSB Phone:	2K85J3EJN
AM Phone:	5K70A3EJN
So-called FM Phone on VHF:	16K0G3EJN
1200 baud Packet on VHF:	16K0G2DCN
9600 baud Packet on VHF:	13K2F1DCN
GPS satellite navigation:	100KG7DCC
On/off keyed Hellschreiber:	050HV1CAN



# ITU EMISSION EXAMPLES

## First example: Continuous wave telegraphy, Morse code, CW

Where  $B_n$  = Necessary bandwidth in hertz

Where bandwidth formulae is:  $B_n$

= BK or (B times K)

B = Modulation rate in bauds

K = an overall numerical factor which varies according to the emission and which depends upon

the allowable signal distortion (K= 5 for fading circuits and K = 3 for nonfading circuits)

How do you convert 25 Words per Minute (WPM) into bauds?

Officially the speed in bauds is the reciprocal of the duration of the shortest or smallest telegraph element, when timed in seconds. The standard way to do this is to

send an agreed standard word consisting of five characters, which happens to be "PARIS" for timing purposes. Which if you count it out is equal to 49 timing units, based on the fact that a dit is the shortest unit. The length of a dah is 3 units; the space between dits and dahs is 1 unit. The space between characters is 3 units and the space at the end of the word is 6 units. As a result, if WPM is equal to 49W symbols per minute. So 49W/60 equals 0.81666 W symbols per second. Therefore 25 WPM x 0.81666 equals 20 Bauds.

25 WPM: B = 20, K = 5, Bandwidth: 100Hz

So the designation of emission becomes: **100HA1AAN** or simplified to **A1A**

Note: the fourth symbol is a two condition code with elements of differing numbers and/or durations The fifth symbol is None.

### Second example: Telephony, double-sideband (single channel) – broadcast station

Where M = Maximum modulation frequency in hertz

Where the Bandwidth formulae is: Bn = 2M or (2 times M)

If M = 3000, the resultant bandwidth 6000 Hz = 6 kHz

So the designation of emission becomes: **6K00A3EJN** or simplified to **A3E**

What happens in the case of a Single Sideband transmission with a suppressed carrier (single carrier)? See third example below:

### Third example:

In this case Bandwidth Bn = M (Modulation) minus the lowest modulation frequency

So if M = 3000. The lowest modulation frequency is 300 Hz. The resultant bandwidth 2700 Hz = 2.7 kHz

So the designation of emission becomes: **2K70J3EJN** or simplified to **J3E**

Note: the fourth symbol is: J – Sound of commercial quality (excluding categories given in subparagraphs 1.10 and 1.11)

Fifth symbol is: None

Note: Although J3E is Single Sideband it is really is useful to distinguish between Lower Sideband and Upper Sideband i.e. J3E/L or J3E/U as the frequency offset will be different in each case.

### Fourth example: Commercial telephony using Frequency Modulation

Where Bandwidth formulae is: Bn = 2M + 2DK

D = Peak deviation i.e. half the difference between the maximum and minimum values of the instantaneous frequency. The instantaneous frequency in hertz is the time rate of change in phase in radians divided by 2 pi (where pi equals 3.14159)  
K = 1

If D = 5000 Hz, M = 3000. The resultant bandwidth 16000 Hz = 16 kHz

So the designation of emission becomes: **16K0F3EJN** or simplified to **F3E**

Note: the fourth and fifth symbols are the same as above

### Fifth Example: PSK31 or BPSK31

The necessary bandwidth is 60Hz or 60 Hz. The originator of PSK31 refers to a bit rate of 31.25 bauds or a bit rate of 31.25 per second, this equates to approximately 35 Word Per Minute in terms of speed. The necessary bandwidth required equates to 2BK. Where B relates to bit rate per second or Modulation rate in baud and K is a factor of 1. Therefore the necessary bandwidth required is 62.50 Hz or 62H5 –

however most papers refer to the necessary bandwidth as 60H0.

The correct mode is G1B. There are two modes with PSK31 either Binary Phase Shift Keying (BPSK) or Quadrature PSK. I noticed that the ARRL show the designator of emission as J2B (BPSK) or J2D (QPSK), based on the normal method used on the air i.e. SSB or LSB.

The ITU designation of emission for BPSK31 is 60H0G1B-- and 60H0G1D-- for QPSK31. However the complete designation of emission for BPSK31 is:

**60H0G1BBN**. QPSK31 is 60H0G1DCN, which uses error correction.

### MFSK16

In the case of MFSK16, the emission designator, the ITU calculations are as follows:

BW = B + M. S.K (where B equals baud rate, M is the number of tones, and S is the tone spacing, K is factor related to keying technique (K equals 1.2 for coherent phase keying or hard keyed FSK)). Using the following example: taken from ZL1BPU:

Symbol Rate = 15.625 baud

Channel Data Rate = 15.625 x log216 = 15.625 x 4 = 62.5 BPS

User Data Rate = 62.5 x 1/2 (Forward Error Rate or FEC Rate) = 31.25 BPS

Text Throughput (CPS) = 31.25 / 10 CPS = 3.125 CPS

Text Throughput (WPM) = 31.25 x 60 / (10 x 6) = 31.25 WPM

Tone spacing is 15.625 Hz

So BW = 15.625 + 16 x 15.625 x 1.2 = 315.625 Hz

Where CPS is Characters Per Second, WPM is Words Per Minute and BPS is Bits Per Second. So the necessary bandwidth becomes 316H. The designation of emission becomes 316HF1B-- using the

appropriate tables. The designation of emission becomes 316HF1BCN (error correction included).

### Appendix – Frequency measurement

<http://en.wikipedia.org/wiki/Frequency>

A1E- Centre frequency of emission  
A3E – Broadcast Stations – Centre frequency of emission and bandwidth taken

Emission Measure frequency at FIB/RTTY Centre frequency or halfway between the two carriers  
F3E/FM Resolution frequency of the modulation

F3C Centre frequency of emission  
F7B Centre frequency of the four carriers

FXX Centre frequency of emission  
G7D Beginning, Centre frequency of emission and End often heard on 30 Metre band

G7DF HF Man Packs 6-PSK or 8-PSK Centre of frequency of emission – heard on all bands.

M7D Beginning, Centre frequency of emission and End – note Pulse Repetition Frequency (PRF)

<http://en.wikipedia.org/wiki/Radar>  
JAM Centre frequency of emissions  
QXX Beginning, Centre frequency of emission and End

J3E Upper or Lower Resolution frequency of the sideband i.e. J3E/L or J3E/U

J8E Resolution frequency of the two sidebands

N0N Zero beat of carrier

P0N or PXX – Beginning, Centre frequency of emission and End – often used by Over The Horizon Radar

VXX – Beginning, Centre frequency of emission and End – often used by Coastal Ocean Dynamics Applications Radar (CODAR)

## IARU

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**Disaster Comms** ZL1DK  
**IARU REGION** 3 Disaster Communications Committee

**Peter Lake**, ZL2AZ, a Director IARU Region 3, maintains close liaison with the committee. His advice is of enormous value.

### Where do I fit in?

As a radio amateur, your NZART Membership is vital to all of us. Amateur Radio is an activity requiring international coordination in radio frequency spectrum matters. This is achieved

through several international organizations and your support is needed.

Membership of NZART acknowledges importance for the continuance of amateur radio in New Zealand, of representation

by radio amateurs to government and liaison between NZART and overseas amateur radio societies.

### ITU — the International Telecommunication Union

The ITU is a United Nations Agency and can be viewed as an assembly of government representatives. See the ITU web page at <[www.itu.int](http://www.itu.int)>. New Zealand is a Member and the New Zealand Administration is the Ministry of Economic Development. The MED spectrum management web page is at <[www.rsm.govt.nz/csm](http://www.rsm.govt.nz/csm)>. Through its International Radio Regulations, the ITU allocates radio services to specific frequency

bands. Member states are required to recognize these treaty provisions when licensing services to operate on specific frequencies within their own regulations and national boundaries. The ITU Radio Regulations also define the Amateur Service and the Amateur Satellite Service and set down other operating requirements. Frequency band allocations and the International Radio Regulations themselves are reviewed at ITU World Radiocommunication Conferences (WRC).

The New Zealand Radio Regulations reflect the International Radio Regulations.



## The International Amateur Radio Union (IARU)

The IARU is a Sector Member of the ITU where it represents the Amateur Services. It is recognized by administrations as the appropriate body to make recommendations on amateur radio issues. The IARU is permitted to present papers for the information of ITU conferences.

The IARU is a worldwide voluntary federation of more than 150 amateur radio societies, founded in 1925. New Zealand joined in 1929. The prime purpose of the IARU is the protection of the Amateur and Amateur Satellite Services. The IARU Constitution is at the IARU web page: <www.iaru.org>.

The IARU is co-ordinated by an Administrative Council (AC) comprising a President, Vice-President, and two representatives from each of the three Regions: Region 1 covers Europe, Russia and Africa, Region 2 the Americas, and Region 3 the remainder including New Zealand and Asia Pacific area.

One society provides the IARU Secretary and the IARU International Secretariat (IS) administrative services. Currently this is the American Radio Relay League (ARRL).

The business of IARU is transacted at triennial regional conferences arranged in sequence so that one is held each year. The IARU member-societies of the Region meet at these regional conferences to discuss common problems, to find solutions, to determine policy, and promote international amateur radio.

Each Region has its own IARU regional organization. NZART is a founder and active member of IARU Region 3.

Founded in 1968, the IARU Region 3 Secretariat is in Tokyo. The affairs of the Region are attended to between conferences by Directors who are elected at the triennial conference.

## NZART

Founded in 1926, NZART is the New Zealand society. The IARU Constitution recognizes only one member-society in each country. NZART is duty-bound to represent the interests of the Amateur and Amateur Satellite Services.

NZART is recognised by and makes representations to the New Zealand Administration, the Ministry of Economic Development, on behalf of itself and the IARU.

NZART also makes presentations to IARU Regional Conferences and

can influence IARU policies.

## IARU representatives at ITU conferences

The IARU is represented at ITU conferences by a selected team of specialists in amateur radio affairs drawn from IARU societies worldwide.

For some important ITU conferences, a representative of the Amateur Service is included in national delegations from Member countries. Where appropriate, NZART finances an Amateur Service representative in New Zealand's delegation. There was an NZART representative on the New Zealand Delegations to ITU conferences in 1979, 1982, 1997, 2003 and 2006.

The International Amateur Radio Union (IARU) Region 3, 14th Triennial Conference was held on 12-16 October, 2009 hosted by the NZART in Christchurch, New Zealand.

Delegates from 10 member societies (ARRL, ARSI, CRSA, HARTS, JARL, KARL, NZART, ORARI, SARTS and WIA) attended, with RAST, RSGB and VARC being represented by proxy. Also attending was the IARU President Tim Ellam VE6SH and Vice President Ole Garpestad LA2RR, from Region 1 President Hans Timmerman PB2T and Secretary Dennis Green ZS4BS and Region 2 Secretary Ramon Santoyo XE1KK.

The IARU R3 Directors had identified two topics, the IARU Monitoring System, and emergency communications, as being highly important, and major decisions were made on both of them.

## The International Radio Regulations

A copy of the text of the regulations pertaining to Amateur Radio can be obtained on request from NZART Headquarters or from the "Study Guide" found at the NZART web page. A full copy of the Radio Regulations is available from the ITU Geneva but occupies several volumes. It is also available on CD-ROM, and is expensive.

The International Radio Regulations do not of themselves regulate radio amateurs. With the status of an international treaty, they set out what administrations are expected to impose by their own national regulations.

## International challenges for amateur radio

All classes of radio service compete for their share of the radio frequency spectrum. Most

services wield strong influence at ITU conferences. Decisions made there are affected by many factors, political, economic and social. At times the conference atmosphere is hostile to amateur radio.

Some decisions take many years to implement. The patient pursuit of long-term policies is needed to ensure the future welfare of the Amateur and Amateur Satellite Services.

The cost of this continuing vigilance is high. It comes from the radio amateurs in national societies and from the devoted voluntary efforts by many amateur radio specialists. A part of your NZART subscription is remitted to IARU Region 3 each year to help fund international activities.

Remember, there is no actual security for the Amateur or Amateur Satellite Service. Constant vigilance, with time and money to protect our regulatory provisions are needed.

## Further information

Enquiries on international radio matters are welcome at NZART Headquarters.

See the IARU web site at <www.iaru.org> and the Region 3 web site at <www.iaru-r3.org>. Both can be accessed via <www.nzart.org.nz>.

## IARU Administrative Council

- Timothy S. Ellam, VE6SH President, Internet: tellam@iaru.org
- Ole Garpestad, LA2RR Vice President, Internet: la2rr@broadpark.no
- Rod Stafford, W6ROD Secretary, Internet: secretary@iaru.org
- Dennis Green, ZS4BS Secretary, IARU Region 1, Internet: iaru-r1@netactive.co.za
- Ramon Santoyo, XE1KK Secretary, IARU Region 2, Internet: xelkk@iaru.org
- Ken Yamamoto, JA1CJP Secretary, IARU Region 3, Internet: secretary@iaru-r3.org

## Region III Executive Committee

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### Director

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### Special Advisor to the

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## IARU Monitoring System Region 3 Coordinator

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## IARU Region 3 Beacon Project Coordinator

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### Assisted by:

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## IARU Region 3 Electromagnetic Compatibility (EMC) Coordinator

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## IARU Region 3

### Electromagnetic Radiation (EMR) Coordinator

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## ARDF Committee Chairperson

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**STARS\*\*\* Task Force (Support  
for the Amateur Radio Service)  
Convenor**  
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AMATEUR RADIO EXAMINATIONS

**General**  
The amateur Service is defined in the Radio Regulations as: a radio-communication service for the purpose of self training, inter communication and technical investigations carried out by amateurs, that is by duly authorised persons interested in radio technique solely with a personal aim and without pecuniary interest.  
In accordance with Article 25.6 of the International Telecommunications Union Radio Regulations regarding technical and operational qualifications of amateur stations, a person operating an amateur station (whether the licensee or other person authorised by the licensee) must be the holder of a General Amateur Operator's Certificate granted in accordance with the Radiocommunications Regulations 2001.  
There is now only one New Zealand amateur radio licence: General Amateur Radio Operator Licence.

**Examination structure**  
There is only one Amateur Radio Examination. It is a sixty-question multiple-choice written examination in: radio regulations, the principles of electricity, radiotelegraphy, and radiotelephony; operating procedures, service codes and abbreviations as are applicable to the amateur service; and in the adjustment and operation of radio apparatus used in a typical amateur radio station. The sixty

questions are randomly-selected by computer from a 600-question public-domain question-bank to form an examination paper. Every exam paper is different. Study Courses Training materials and a book showing all the 600-questions are available from NZART at the address given below. See the NZART web page: <www.nzart.org.nz>.

**Requirements for certificates**  
Forty correct answers are required for a pass.

**Taking the examination**  
The Examination Division of NZART conducts examinations on behalf of the Ministry of Economic Development Radio Spectrum Management group (MED RSM).  
The date, time and place for the examination are by mutual arrangement between the supervisors and the candidates. The allowed time for the examination is two hours, with an extra reading time of ten minutes.

**Applications for examinations**  
Applications for all examinations should be made to your local examination supervisor. A list of supervisors can be found on the NZART web page or from NZART Headquarters. The supervisors expect you to contact them.

**Examination fees**  
A fee of \$5 is required to accompany the examination

application. Should you fail the first time and wish to re-sit, there is no further fee.

**Examination result notification**  
If you are successful you will receive an Examination Result Notification (ERN) form direct from the examiners. On completion of a Radio 4A Application Form, please forward the ERN and the application form to NZART on the address listed on the form together with \$95 which includes a one year membership to NZART.

**Examination recounts**  
Applications for recounts of the marks awarded must be made to the NZART Examination Division no later than one month after the examination in respect of which mark in question was awarded.

**Call-signs**  
Your licence gives your call-sign. Application may also be made for a specific radio call-sign, if not already allocated.

**Further enquiries**  
Please direct any enquiries about the Amateur Radio Examination to: NZART Examination Division, PO Box 40-525, Upper Hutt 6415. Telephone (+64 4) 939-2189, Fax (+64 4) 939-2190. E-mail <exam@nzart.org.nz>.

**Morse code**  
Competency in the Morse code is not needed for a licence.

NZART provides a Morse test for travellers to countries requiring evidence of Morse competency for reciprocal licensing. Tests are also available by mutual arrangement for individual challenge purposes.  
A certificate of achievement is available from Morse testing supervisors on attaining a speed of five words per minute or higher, sending and receiving. The test details are available on application.

**Note to branches**  
The NZART Morse Testing Service is managed by the Examination Co-ordinator, an officer of the Association. The Morse tests are administered by participating NZART Branches. Branches are responsible for choosing a Morse Tester and a Scrutiniser from the members of their Branch. These persons should be members of NZART. NZART requires the names, call signs and contact details of the persons the Branch nominates to these roles, with this information annually updated. The Examination Co-ordinator will appoint the Morse Examiners. Each is given registration number. A candidate is to contact a local Morse Tester. The Tester will arrange a date for the test. The test text pieces will be computer-generated in Farnsworth format. Each Branch is responsible for providing the necessary hardware, computer, oscillator, key and earphones as required. There is no fee for a Morse test.

Radiocommunications Regulations (General User Radio Licence for Amateur Radio Operators) Notice 2011

Pursuant to section 111 of the Radiocommunications Act 1989 and Regulation 9 of the Radiocommunications Regulations 2001, and acting under delegated authority from the chief executive, I give the following notice.

**Notice**  
**1. Short title and commence-**

**ment** — (1) This notice is the Radiocommunications Regulations (General User Radio Licence for Amateur Radio Operators) Notice 2011.  
(2) This notice comes into force on 30 November 2011.  
**2. General user radio licence** — A general user radio licence is granted for the transmission of radio waves by amateur radio

operators in New Zealand, for the purpose of communications in the amateur radio service in accordance with the terms, conditions and restrictions of this notice.  
**3. Terms, conditions and restrictions applying to New Zealand amateur operators** — (1) Persons who hold a General Amateur Operator's Certificate of

Competency and a callsign issued pursuant to the Regulations may operate an amateur radio station in New Zealand.  
(2) The callsign prefix of "ZL" may be substituted with the prefix "ZM" by the callsign holder for the period of, and participation in, a recognised contest, or as the control station for special event communications.



(3) Operation on amateur bands between 5 MHz and 25 MHz is not permitted unless a person has held a General Amateur Operators Certificate of Competency for three months and logged 50 contacts during this period. The person must keep the logbook record for at least one year and, during this period, produce it at the request of the chief executive.

#### 4. Terms, conditions and restrictions applying to visiting amateur operators —

(1) Persons visiting New Zealand who hold a current amateur certificate of competency, authorisation or licence issued by another administration, may operate an amateur station in New Zealand for a period not exceeding 90 days, provided the certificate, authorisation or licence meets the requirements of Recommendation ITU-R M.1544 or CEPT T/R 61-01 or CEPT T/R 61-02 and is produced at the request of the chief executive.

(2) The visiting overseas operator must use the national callsign allocated by the other administration to the operator, in conjunction with the prefix or suffix "ZL" which is to be separated from the national callsign by the character "/" (telegraphy), or the word "stroke" (telephony).

#### 5. Terms, conditions and restrictions applying to all amateur operators —

(1) The use of callsigns, including temporary and club callsigns, must be in accordance with publication PIB 46 "Radio Operator Certificate and Callsign Rules" published at [www.rsm.govt.nz](http://www.rsm.govt.nz)

(2) Callsigns must be transmitted at least once every 15 minutes during communications.

(3) National and international communication is permitted only between amateur stations, and is limited to matters of a personal nature, or for the purpose of self-training, intercommunication and radio technology investigation, solely with a personal aim and without pecuniary interest. The passing of brief messages of a personal nature on behalf of other persons is also permitted,

provided no fees or other consideration is requested or accepted.

(4) Communications must not be encoded for the purpose of obscuring their meaning, except for control signals by the operators of remotely controlled amateur stations.

(5) Except as provided to the contrary in this notice, transmitter power output must not exceed 1000 watts peak envelope power (pX), as defined in ITU Radio Regulation 1.157.

(6) Amateur stations must, as far as is compatible with practical considerations, comply with the latest ITU-R recommendations to the extent applicable to the amateur service.

(7) In accordance with Article 25 of the International Radio Regulations, amateur operators are encouraged to prepare for, and meet, communication needs in support of disaster relief.

(8) Amateur beacons, repeaters and fixed links may not be established pursuant to this licence.

(9) Unwanted emissions outside the frequency bands specified in this Schedule must comply with the requirements of technical standard ETSI ETS 300 684 published by the European Telecommunications Standards Institute (ETSI).

(10) This general user radio licence applies only to transmissions within the frequency ranges set out in the Schedule to this licence. All such transmissions must be made in accordance with the notes for the frequency range in which that transmission take place and in accordance with the other conditions set out in this licence.

**6. Consequential revocation of licences —** The Radiocommunication Regulations (General User Radio Licence for Amateur Radio Operators) Notice 2010, dated the 12th day of July 2010 and published in the New Zealand Gazette, 15 July 2010, No. 83, page 2270, is revoked.

#### Schedule

Frequency Range	Notes
130 to 190 kHz	2, 4, 6
505 to 515 kHz	2, 4, 7, 8

1.80 to 1.95 MHz	2
3.50 to 3.90 MHz	2
7.00 to 7.10 MHz	1
7.10 to 7.20 MHz	
7.20 to 7.30 MHz	2
10.10 to 10.15 MHz	2
14.00 to 14.35 MHz	1
18.068 to 18.168 MHz	1
21.00 to 21.45 MHz	1
24.89 to 24.99 MHz	1
26.95 to 27.30 MHz	2, 3, 5, 6
28.00 to 29.70 MHz	1
51.00 to 53.00 MHz	2
144.00 to 146.00 MHz	1
146.00 to 148.00 MHz	2
430.00 to 440.00 MHz	1, 2, 3
921.00 to 928.00 MHz	3, 7
Frequency Range	Notes
1.24 to 1.30 GHz	1, 2
2.396 to 2.45 GHz	1, 3
3.30 to 3.41 GHz	1, 2
5.65 to 5.85 GHz	1, 3
10.00 to 10.50 GHz	1, 2
24.00 to 24.05 GHz	1, 3
24.05 to 24.25 GHz	3
47.00 to 47.20 GHz	1
75.50 to 76.00 GHz	1, 2
76.00 to 81.00 GHz	1, 2
122.25 to 123.00 GHz	2, 3
134.00 to 136.00 GHz	1
136.00 to 141.00 GHz	1, 2
241.00 to 248.00 GHz	1, 2, 3
248.00 to 250.00 GHz	1
275.00 to 1000 GHz	2, 4

#### Notes to Schedule

1. The following ranges of frequencies may also be used for amateur satellite communications:

7.00 to 7.10 MHz	3.40 to 3.41 GHz
14.00 to 14.25 MHz	5.65 to 5.67 GHz (a)
18.068 to 18.168 MHz	5.83 to 5.85 GHz (b)
21.00 to 21.45 MHz	10.45 to 10.50 GHz
24.89 to 24.99 MHz	24.00 to 24.05 GHz
28.00 to 29.70 MHz	47.00 to 47.20 GHz
144.00 to 146.00 MHz	75.50 to 81.00 GHz
435.00 to 438.00 MHz	134.00 to 141.00 GHz
1.26 to 1.27 GHz (a)	241.00 to 250.00 GHz
2.40 to 2.45 GHz	

(a) Limited to the earth-to-space direction.

(b) Limited to the space-to-earth direction.

2. These frequencies are, or may

be, allocated for use by other services. Amateur operators must accept interference from, and must not cause interference to, such other services.

#### 3. The frequencies:

27.12 MHz	(26.957 – 27.283 MHz),
433.92 MHz	(433.05 – 434.79 MHz),
921.5 MHz	(915 – 928 MHz),
2.45 GHz	(2.4 – 2.5 GHz),
5.8 GHz	(5.725 – 5.875 GHz),
24.125 GHz	(24.00 – 24.25 GHz),
122.5 GHz	(122 – 123 GHz); and
245 GHz	(244 – 246 GHz)

are designated for industrial, scientific and medical (ISM) purposes. These frequencies may also be allocated to Short Range Device (SRD) services. Amateur operators must accept interference from ISM and SRD services within these frequency ranges.

4. Allocated to the amateur service on a temporary basis until further notice.

5. Telecommand and telemetry operation only.

6. Radiated power must not exceed 5 watts e.i.r.p.

7. Radiated power must not exceed 25 watts e.i.r.p.

8. The bandwidth of emissions must not exceed 200 Hz.

Dated at Wellington this 9th day of November 2011. SANJAI RAJ, Group Manager, Radio Spectrum Management, Ministry of Economic Development.

#### Explanatory Note

*This note is not part of the notice, but is intended to indicate its general effect.*

#### This notice:

1. Prescribes that, pursuant to Regulations made under the Radiocommunications Act 1989, a general user radio licence is granted for the transmission of radio waves by amateur radio operators in New Zealand, for the purpose of communications in the amateur radio service in accordance with the terms, conditions and restrictions of this notice. This notice comes into force on 30 November 2011.

2. This notice replaces the Radiocommunications Regulations (General User Radio Licence for Amateur Radio Operators) Notice 2010. The principal change from that notice is the change in transmitter power output as defined in section 5(5).

## CHANGE OF ADDRESS NOTIFICATION:

Please send to the Business Manager any details of your new address to retain your membership benefits. Advise the Ministry of Economic Development (Radio Spectrum Management) or change your address online (refer Call-sign section).

**REMEMBER:** If you change your address you must notify the nearest office of the Ministry of Economic Development (Radio Spectrum Management), AND the Business Manager, NZART.

The NZART QSL Bureau is one of a network of approximately 170 bureaux established by the IARU to facilitate the exchange of QSL cards between NZART members and radio amateurs and listeners throughout the world.

## Outward QSL cards

The service is free to both transmitting and non-transmitting members of NZART—**non-members** may make use of this service at a cost of **25c per card**. All QSL cards for forwarding to radio amateurs and listeners in New Zealand and overseas countries should be posted to:

The QSL Manager, NZART QSL Bureau, PO Box 857, Wanganui Mail Centre, WANGANUI 4540.

The call-sign of the station to which the card is addressed should be **printed clearly on both sides** of each card. Are you sending your card to a DX-station's Manager? If so, please write the Manager's call on the back of the cards. (Cards are sorted using the call printed on the back of the card.) If you see fit not to write the recipients' call-signs on the back of your cards, it is pointless to carry out the last instruction—we are not clairvoyants! When writing call-signs onto your cards, please take care with the forming of the letters and numbers. Make sure that the letter V will read V, not U, an "S" looks like an ess and not the figure "5" and vice versa, etc. This will greatly help the Bureau staff in their sorting! Remember also that

English is not the first language of everybody handing and receiving your cards!

**Please sort your QSL cards** into New Zealand call-district order (ie ZL1-ZL2-ZL3-ZL4), USA call-district order (USA prefixes are kept together—A-K-N & W1 cards all go to their First District Bureau; likewise all A-K-N-W2 cards go to the Second District Bureau and so on), and all others in alphabetical order: eg CE, EA, ES, EU, G/M, I, OK, S5, SM, UA, UN, UR, W1-W2-W3, etc., VU, ZL1-ZL2-ZL3-ZL4, 3D, 5W, 9A etc. **Please do not separate countries with rubber bands, strips of paper etc.**

Members must enclose a current year *Break-In* label with each posting. After complying with the above, sit back and be patient!

## Inward QSL cards

The NZART QSL Bureau provides a **free inward service for all New Zealand amateurs and listeners**.

## Collecting cards from the sub-bureaux by members and non-members

Please note that the four New Zealand sub-bureaux are arranged to cover the four mainland prefixes. A ZL1 living anywhere in New Zealand deals with the ZL1 sub-bureau, ZL2s likewise with the ZL2 sub-bureau, and so on through to the ZL4s. Supply your particular QSL sub-bureau (listed below) with a supply of suitable size self addressed stamped

envelopes (SASEs) to receive your incoming cards. Envelopes should be numbered and "Last Envelope" marked on one so that you are reminded when to renew the supply. Please make sure that you include your call-sign on the front of your envelopes as each sub-bureau only deals with call-signs and not with operators' names. Any specific requests for forwarding cards should be printed on the back of the envelopes: for example "send monthly" or "send when there are 10 cards" etc.

Some Branches have special arrangements for "Branch postings" in place with the appropriate sub-manager. Contact your local Branch secretary for information. (The possible provision of this service is totally the prerogative of each individual sub-manager and there is no compulsion on any person to be a party to any such collective scheme.)

## QSL sub-managers

- ZL1: Mr R Glover ZL1BGB, 5 Wyman Place, Pakuranga Heights, AUCKLAND 2010
- ZL2: Mr A. H. Marr ZL2AGY, 8 Campbell Street, HAWERA 4610
- ZL3: Mr K. A. Holdom ZL4HU, P.O. Box 7, CLYDE 9341
- ZL4: Mr D. A. Adams ZL4OZ, 26 Wills Street, Balaclava, DUNEDIN 9016

## Your QSL Card

- 1 Should not exceed 140 ×

90mm in size.

- 2 Have all the necessary information on one side of the card — if you intend having a two-sided card, make sure your call-sign is printed on **both** sides.
- 3 Use Universal Co-ordinated time (UTC) (formerly referred to as GMT, also referred to as Zulu time)—New Zealand Standard time (NZST) or New Zealand Daylight Saving Time (NZDT) is meaningless to 99.9 per cent of amateurs—and you do want a card back from them!
- 4 It is advisable to write out the name of the month to avoid confusion.
- 5 **Do not correct mistakes—make out a new card.** Altered cards are valueless to the recipient. Any further information concerning the business of the QSL Bureau, or requests for info on DX station QSL Managers/direct mail addresses (we will do our best to assist!) can be obtained from the QSL Manager at PO Box 857, Wanganui Mail Centre, WANGANUI 4540 or e-mail <zl2rr@xtra.co.nz>.

## PS! Special calls and DXpeditions

If you, or your Branch, put on a special event/contest station using a special call-sign allocation for the duration thereof, or partake in a DXpedition, please notify the QSL Bureau Manager and supply him with the relevant QSL Manager info!



## Devoted to Low Power Communication

Subscription; NZ \$28 a year. Banked to ASB account 12-3011-0984272 -58 <www.gqrp.com>

Membership Secretary; Tony G4WIF g4wif@gqrp.co.uk, PO Box 298, Dartford, Kent DA1 9DQ, England.

Four copies of SPRAT magazines (Journal of the G-QRP-Club) posted every year and a copy of the Member's Handbook.  
Editor Rev George Dobbs G3RJV.

Club sales of books, parts and back issues of SPRAT (CD ROMs available from Graham Firth G3MFJ)  
13 Wynmore Drive, Bamhope, Leeds LS 16 9DQ, England. <G3mfj@gqrp.co.uk> Payments can be made in  
New Zealand to the NZ Club Agent; Phil Tarrant ZL2NJ.

For more information contact Phil Tarrant ZL2NJ <philtar@xtra.co.nz>



## A Responsibility for all Radio Amateurs!

The amateur radio qualification is an achievable challenge for most people and is useful to career seekers in our technological world. It shows aptitude, a sincere interest in communications, and identifies an achiever. Which can give a jump over others in this competitive world. The late 1940s was a time with a wave of new entrants into amateur radio. Let us all try to promote a return to that level of interest! The NZART Council encourages newcomers into Amateur Radio. This calls for the help of all radio amateurs. As a challenge to all of us, the NZART Council has adopted the expression, "The New Wave", to embrace initiatives and objectives which will encourage new entrants to the world of amateur radio.

The NZART Constitution in its object statement says: "The objects of the Association shall be the maintenance and expansion of the Amateur Service in New Zealand by:

- a) the encouragement of recruits into the Amateur Radio movement
- b) the provision of guidance and instruction in radio techniques and operating

- c) the promotion organisation and conduct of activities on a national and local basis ..."

These objects are further reflected in wording in the NZART Strategic Plan, in particular Objective 2, which states:

"To promote knowledge of amateur radio and encourage newcomers.

To assist Branches in local activities, especially in schools.

To provide education and training aids.

To award suitable prizes and other recognition."

And, in the plans of action:

"To publish information in Break-In, training materials and aids, educational and publicity material."

The NZART Strategic Plan Objective 3 states: "To provide guidance and instruction in radio techniques and operating, and encourage practical experimentation."

With your guidance and your help, others too can experience the thrills of Amateur Radio. Active encouragement and support are sought from all NZART members and Branches to recruit newcomers and to run classes in preparation for

the amateur radio examination. Branches are encouraged to actively promote Amateur Radio. Master copies of brochures, posters and other leaflets and publicity material are available to Branches free of charge, from NZART Headquarters.

A sticker is available to NZART members from NZART Headquarters for 50c each. This is for displaying in the rear window of vehicles to show your support in a national campaign to increase the awareness of Amateur Radio in the general population. Many computer users are unaware of amateur radio and what it has to offer. You are encouraged to widely advertise the NZART World Wide Web page, <<http://www.nzart.org.nz>>

Simple-to-construct equipment is a way to show youth groups and other interested persons the fun of Amateur Radio. Show how inexpensive home-construction brings delight and excitement from the achievement of communicating without wires over long distances using self-built gear. Articles from Break-In may be freely photocopied and distributed for this purpose. Do you know anyone who has shown

interest in Amateur Radio? A youth or grandchild perhaps? Spread the word by demonstration! After passing the amateur radio examination, a call-sign that is unique world-wide is issued by the Ministry of Economic Development. The challenge to attain such an identifying call-sign brings its own rewarding fun. A local "group project", with the challenge to interest newcomers to develop their own local on-air amateur radio net, is worthy of consideration and encouragement. Construction of receivers, transmitters and other projects under the guidance of experienced constructors at "club workshop nights" is a worthy Branch activity. Each Branch should appoint an "NZART Agent" as one of their executive, the task being to gain increases in NZART members, both Transmitting and Non-Transmitting, in their local areas. A national and concerted effort by all New Zealand Radio Amateurs to promote Amateur Radio is necessary to ensure the continuation of a healthy and vigorous Amateur Service. Help bring the "The New Wave" of radio amateurs!



Jane Atkinson ZL2QO, Jim Meachen ZL2BHF, Stephen McNeill ZL4HG

*This article has been prepared by those listed above on behalf of the Wellington VHF Group, Branch 74 NZART (Inc.), PO Box 12-259 Wellington, to offer guidance to the newcomer to the wonderful world of amateur radio.*

*"Sam the Mobile Man" guest appearance courtesy of Sue Lill*

© August 1994

## Why such an article?

You've just got your licence. Your new rig has arrived today and is ready for use. You turn the power on. So, what do you do?

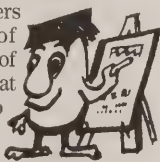
It can be pretty daunting when you first start out knowing what to say, or what not to say.

This article is designed to help you through your first few contacts. It's important to remember that there are no fixed rules. Many of the observations that are made in this article are the result of experiences we have had over a number of years, and you must remember that your operating may not necessarily cover what we've been interested in. So be it. This is a guide. Use it as a kind of à la carte offering of ideas.

The only way to become familiar with the operating procedures on VHF or UHF is to spend some time listening to the good operators, noting how and why their methods succeed where those of the poor operator do not. It is quite important as newcomers that you should be discriminating in this respect, and not simply mimic what you have heard when going on the air for the first time. To summarize, copy the good operators, and not the bad ones!

## How this article is written

This article covers a number of different facets of amateur radio that you are likely to encounter in the VHF spectrum.

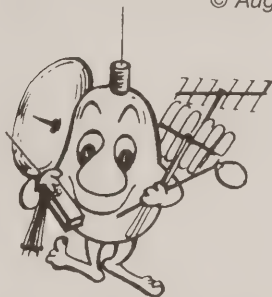


You'll find these are often the same ideas you'll use on HF, but that kind of operating is beyond the scope of this article. You can find some excellent books on the general topic of operating and you're encouraged to seek out the information contained therein. Some good examples of operating books are as follows:

★ A Guide to Amateur Radio, Pat Hawker G3VA, RSGB Nineteenth Edition. (An older publication).

★ RSGB Radio Amateur Operating Manual 7th Edition By Don Field, G3XTT & Steve Telenius-Lowe, 9M6DXX

★ The ARRL Operating Manual for Radio Amateurs, ARRL, Ninth Edition.



## Some terminology

There are lots of words that are used everyday in the world of VHF in amateur radio. Among the most common are as follows: **AM** Amplitude Modulation. A method of voice encoding a transmission which is seldom used these days. Specifically the strength of the signal transmitted varies with the strength of the voice signal.

**AMSAT** Amateur Satellite Corporation. An amateur radio organization promoting and developing the amateur satellite service. Over two dozen satellites have been built by amateurs worldwide and are universally available.

**APRS** Automatic Position Reporting System. An amateur radio based automatic position reporting system for tracking and digital communications.

**AREC** Amateur Radio Emergency Communications. Groups of amateurs within NZART Branches who provide emergency communications in conjunction with other organizations as the situations demand.

**ATV** Amateur Television. The transmission of video signals by radio amateurs. This transmission can sometimes take place through a special kind of repeater.

**Autopatch** A device for interfacing a repeater to a telephone line. Such a device responds to audio tones generated by a telephone touch-tone pad connected to the user's rig or microphone.

**Break** The word used to interrupt a conversation on a repeater, often to indicate there is an emergency.

**Call Book** An annual publication by NZART that contains amateur call-signs, frequency allocations, repeater maps and other vital operating information.

**Channel** The pair of frequencies, input and output, used by a

repeater.

**Clear** Indicates the end of a contact.

**Coverage area** the geographic area within which a repeater provides communications (sometimes called the footprint).

**CQ** A general call made requesting someone to talk to.

**CTCSS** Continuous Tone Coded Squelch System. (Sometimes known as PL or Private Line.) A sub-audible tone system used when you want to activate just one or a small number of remote receivers.

**CW** Continuous Wave. Commonly known as Morse code. Used in weak signal or long distance applications and sometimes in conjunction with amateur satellites. This is an "on-off" or dot-dash type of transmission.

**Data repeater** A repeater specifically designed for use in passing data, rather than voice communications. Of course, it may be used for both.

**Digipeater** A Packet radio repeater. Packet radio is a form of data transmission. Voice cannot be transmitted through a digipeater.

**Dropping out** The situation that exists, while you are using a repeater, when your signal does not quite have enough strength to keep the repeater triggered (see "Trigger").

**D-STAR** Digital Smart Technologies for Amateur Radio. This is a digital voice and data protocol specification developed as the result of research by the Japan Amateur Radio League to investigate digital technologies for amateur radio.

**DTMF** Dual Tone Multi Frequency. A system often used for repeater control, using two tone frequencies. This control is often achieved by a simple keypad on your microphone or rig.

**Duplex** A mode of communication in which you transmit and receive simultaneously.

**EchoLink** A computer based Amateur Radio system that allows radio amateurs to communicate with one another using Voice over IP (VoIP) technology on the internet for at least part of the path between them.

**FM** Frequency Modulation. A method of voice encoding a transmission, which is frequently used in conjunction with repeaters. Specifically, the

strength of the signal transmitted is constant but its frequency varies with the strength of the voice.

**FTMAG** Frequency Management and Technical Advisory Group. A group that advises NZART on technical matters, particularly those relating to VHF and repeaters.

**Full quieting** A received signal that contains no noise.

**Handheld** A portable receiver that is small enough to fit in the palm of your hand.

**Handle** This refers to your name. Note, the term "personal" is not generally used in amateur radio. **Horizontal polarization** The nominal orientation that a radiowave is taken to have as a result of an aerial's physical layout and orientation. Horizontal polarization is by convention very often used in weak signal applications at VHF/UHF.

**Input frequency** The frequency that the repeater receives on, and also the frequency on which you transmit to the repeater.

**IRLP** Internet Radio Linking Project. A project that links amateur radio stations around the world by using Voice over IP (VoIP). Each gateway consists of a dedicated computer running custom software that is connected to both a radio and the internet. This arrangement forms what is known as an IRLP Node.

**Magnetic mount** (also **Mag Mount**) A mobile antenna with a magnetic base that enables quick installation and removal from a car.

**Ministry of Economic Development (Radio Spectrum Division)** Ultimately responsible for the administration of all the radio frequency spectrum in New Zealand.

**NiCd** (also **Nicad**) A Nickel-Cadmium battery that may be recharged.

**NZART** New Zealand Association of Radio Transmitters (Inc). New Zealand's national amateur radio society, PO Box 40-525, Upper Hutt.

**Offset** The difference between a repeater's transmit and receive frequencies. In New Zealand this is plus or minus 600 kHz on the 2 m band and 5 MHz on the 70 cm band.

**Output frequency** The frequency that the repeater transmits on, and also the frequency on



which your receiver receives the repeater.

**Over** The word used to indicate the end of a voice transmission.

**Packet radio** A way of transferring data or messages between amateurs across town, about the country or around the world.

**Phone patch** A device for interfacing the audio input and output of a radio transceiver to a telephone line.

**RDF or DF** Radio Direction Finding. The amateur technique of locating a transmitter.

**Repeater trustee** Person elected by an NZART Branch to take responsibility for proper operation of a repeater.

**Roger** The word that indicates all information was received correctly.

**SAR** Search And Rescue.

**Simplex** A mode of communications where you transmit and receive on the same frequency.

**Sked** A pre-arranged radio contact between two or more stations.

**SSB** Single Sideband. A method of narrow band voice encoding commonly used for long-distance or weak signal communications in both the high Frequency (HF), VHF and UHF parts of the spectrum. Very commonly used in conjunction with amateur satellites.

**STSP Repeater** Short Term Special Purpose Repeater. A repeater designed for emergency use or during special events.

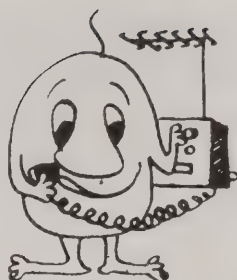
**Tone pad** A device that is used to generate a standard set of tones that can be used to control certain functions on a repeater, or remote equipment (see DTMF).

**Triggering** To activate a repeater by transmitting on its input frequency.

**Vertical polarization** The nominal orientation that a radio wave is taken to have as a result of an aerial's physical layout and orientation. Vertical polarization is by convention very common in repeater operation at VHF/UHF. Antennas on handhelds when held upright and on cars are vertically polarized.

## NZART

The New Zealand Association of Radio Transmitters (Inc) is New Zealand's representative society for radio amateurs. It provides a wealth of services to assist both the new and established amateurs. It publishes a monthly magazine (Break-In) and an annual Call Book. It represents the interests of amateur radio at both the national and international levels. It is controlled by an Executive Council elected by members. It has over 80 Branches



throughout New Zealand, and has a membership of over 3000 amateurs.

One of the services that is provided by NZART is the planning of band usage and the national co-ordination of repeaters and beacons. It does this based on the recommendations of its Frequency Management and Technical Advisory Group (FMTAG).

Inquiries about NZART services and membership may be directed to:

NZART Headquarters  
PO Box 40-525  
Upper Hutt

## Establishing a call

There are two accepted way of establishing contact with another station. The first method is to put out a general call to all stations, known as a "CQ", and to hope that another station responds. The second is to call another specific station by prior arrangement, known as keeping a "sked", or after the other station has just finished a contact or called CQ. CQ calls are not normally made through repeaters. Instead, stations announce that they are "listening" on the repeater. For example, you might say:

"This is ZL2BHF listening seven-ten."  
To start a sked with another station, you will call the other station by its call-sign, followed by your own call-sign, such as:

"ZL2QO, this is ZL4HG."  
The station that is being called might have his or her call-sign repeated a few times, just in case they don't hear the single call. You might also be wise to issue your own call-sign in phonetics so that there is no mistake who you are. For example:

"ZL2QO, ZL2 Quebec Oscar, ZL2QO, this is ZL4HG, ZL4 Hotel Golf, ZL4HG."

However, remember that phonetics really only need to be used to clarify who you are in conditions that might make certain letters ambiguous, or where the band is noisy, or where your signal is likely to be weak. Over-use of phonetics is rather annoying, and time consuming.

## Answering a call

You answer a CQ or sked call

from another station in the same way that you would make the sked call in the first place. For example, in the above instance, where ZL4HG is trying to call ZL2QO, the latter station might answer the call in the following way:

"ZL4HG, this is ZL2QO ..."  
and the conversation would continue. It's that simple!



## How to pass transmission to another station

When you have finished saying what you want to say on one transmission, and you want the other station to reply, you do so by simply saying the word "over". Before you say the word "over", you may want to indicate the other station's call-sign, and your call-sign too, in that order. Note that it is not absolutely necessary to give both call-signs at the beginning and end of each and every over, your own call-sign will suffice. But, if you do give the call-sign, you must give the full call-sign, not an abbreviated version. For example, use "ZL2BHF" and not "2BHF" or "BHF".

## Letting other stations in

If you are in the middle of a conversation, and a station transmits his call-sign in the pause between transmissions, the next station in the queue to transmit should acknowledge that station and permit him or her to make a call and join the conversation. It is not polite to ignore him and, furthermore, it is rude to acknowledge him but not to let him speak. You never know, the calling station may need to use the repeater immediately. He may have an emergency on his hands, so let him make a transmission promptly.

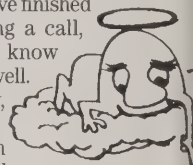


## Joining an existing conversation

If you wish to join a conversation that is already in progress, transmit your call-sign between transmissions. The station that transmits after you drop in your call-sign will acknowledge you, and usually invite you to transmit.

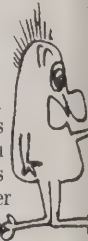
A brief pause, say three seconds, before you begin each transmission allows other stations to participate in the conversation. So don't transmit immediately that the other station stops. If you begin transmitting too quickly, you can prevent other stations from getting in. Also, there might be an emergency, so leave a pause!

Before you join an existing QSO, stop and think, "is it appropriate for me to join in?". If it's a technical matter and you know something about it, it's probably all right. If it's on a more personal level, it might be better to wait until they have finished before giving a call, unless you know them fairly well. Either way, just give your call-sign and wait to be invited in. Jumping straight in with your comments is no better manners on the air that it is in person.



## How to tell when it's your turn to talk

The station with whom you are talking will pass transmission back to you by one of the methods outlined above. Remember the pause before you transmit!



## When and how often to give call-signs

A major source of frustration and annoyance to many operators can be the excessive use of call-signs. Take this example: "ZL4 HG from ZL2BHF, are you parked yet Stephen? Over." "ZL2BHF from ZL4HG. Yes. Over." "ZL4HG from ZL2BHF, OK I'll see you later. Over." "ZL2BHF from ZL4HG, over where, over."

We suggest you identify yourself at regular intervals, say once every ten minutes, as well as at the beginning and end of a conversation.

## Standards of language, and topics best avoided

Acceptable language should be used at all times. Even what seem like mild expletives can cause offence to some people, and may pave the way for worse behaviour from others.



Whatever bands, mode or type of operating one is undertaking, there is a fundamental point to remember. That is that the “private” conversation with the other station is actually in public. Never discuss emotive subjects, such as politics, race or religion over the air to avoid the possibility of giving offence to others. Never give any information over the air which might be of assistance to the criminally inclined, such as the time that a house is unoccupied, dates of holidays, and valuables in the house. Telephone numbers, especially those belong to others, should be handled with considerable discretion.

#### Unidentified transmissions

Occasionally you may hear a conversation that you think you can enhance with a suitably witty addition, suitably anonymous. Don't be tempted to do so! All transmission must be identified! If you hear someone who appears to be a pirate, or who might perhaps be trying to bait the users of the frequency, don't rise to the bait—just ignore them. They will soon become bored and go away.

#### List of commonly heard Q Codes

Q Codes were originally developed for use with Morse code, to speed up the sending of commonly-used phrases. They are not strictly necessary when carrying on a voice contact, since it is usually just as quick to use the ordinary English equivalent: eg “Go to six-five-two-five” instead of “QSY six-five-two-five”. However, some Q Codes are still used quite a bit on VHF and UHF. The more commonly used ones are:

**QRM** Interference  
**QRN** Static  
**QRO** High power  
**QRP** Low power  
**QRT** Cease transmitting  
**QRX** Stand by  
**QRZ** Who is calling? Who is there?  
**QSB** Fading  
**QSO** Contact, conversation  
**QSY** Change frequency, go to  
**QTH** Location

#### What a repeater is and how it works

A repeater is a special kind of transmitter and receiver combination that receives a signal and simultaneously retransmits it. A repeater situated on a vantage point such as a hilltop can dramatically increase the range of VHF and UHF communication in hilly areas and for users of low-power transceivers such as handhelds. To prevent the repeater from becoming unusable

due to feedback, the receive and transmit frequencies are different. The difference between the two signals is known as the offset or split (see definitions).

To access a repeater, an amateur transmitter has to be set up so that it transmits on the repeater's input frequency and receives on the repeater's output frequency. Most (but not all) repeaters continue to transmit a carrier (known as the “tail”) for a few seconds after the input signal ceases, so that the user can check that he or she is actually accessing the repeater. A list of repeater frequencies is given in Section 7 of this Call Book.

In New Zealand all repeaters are “open”, that is, any licensed amateur is permitted to use the repeater without necessarily being a member of the local club. This is not necessarily the case in other countries.

#### Repeater timeouts

Some repeaters incorporate timing devices. These prevent an over from lasting longer than the time that the repeater is set to, usually two or three minutes. If a station transmits for longer than this, the repeater will cease retransmitting after the allotted time is up and a deathly hush will descend upon the frequency. The repeater timer resets when a new transmission begins. Two repeaters that currently incorporate this feature are Motueka 670 and Manawatu 910 (part of the National System).

#### Repeater alarms

Some of the more sophisticated repeater systems incorporate alarms to warn users of such things as power failure. Usually some kind of tone or signal will appear briefly at the end of each over.

The signal that appears after each transmission on Blenheim 695 is not an alarm but an identifier. It transmits the characters “BM” in Morse.

If you hear an alarm signal, first make a note of what type it is. If it is a digitized voice, what it is saying? Notify the repeater trustee as soon as possible (within reason—phone calls at 3 am are unlikely to be appreciated). If you don't know who the trustee is, get in touch with a committee member of the branch responsible for the repeater.

Most mains-powered repeaters have battery backup systems so that they can keep going if the power fails. As the repeater might have to remain on emergency power for some time, it is best not to use the repeater unless you really need to. Conserve

emergency power for emergency use.

#### DTMF and CTCSS control codes

Some repeaters will respond to DTMF tones (see your transceiver manual to determine if your set can generate these tones). These fall into two main types: codes for use only by trustees for controlling repeater functions, and codes for use by amateurs in general. The most common in the latter group is the signal strength report generator. If a certain sequence of DTMF tones is transmitted, the repeater will respond with an indication of the signal strength it has received. The sequence of tones and the type of response received will vary from repeater to repeater. One thing remains constant with all of them: the need to IDENTIFY YOURSELF. Something along the lines of “This is ZL2BHF testing” is usually sufficient.

The uses of continuous tone coded squelch system (CTCSS) are many and varied. It may be used, for instance, by one station to contact a second without the second station being disturbed by other stations on the frequency. This may be useful when a station is waiting for a specific station to talk, but it is not the way most of us operate. A second use of CTCSS is as a warning that your station is being called, without necessarily locking out other stations. Manufacturers offering CTCSS facilities on their rigs often do so in a way that makes these facilities specific to their products; this may limit the usefulness of this feature. So, you should consult other amateurs before you use these facilities.

#### The National System

The National System is a series of dedicated linked high-quality repeaters on the 70 cm band. When a station accesses one of these repeaters, the signal is relayed to all other repeaters in the System and can be heard simultaneously up and down the country. For example, a station with a handheld in Wellington can talk via the System to a station in Auckland as if he or she were in the local region.

#### Guidelines for repeater use

Your local repeater will be monitored by more people than any simplex frequency, both by amateurs and non-amateurs. For many people it will be the only one they use—if it is occupied they will not be able to go to another one in the same way that another simplex channel can be used if one is busy. Therefore, extra courtesy and consideration

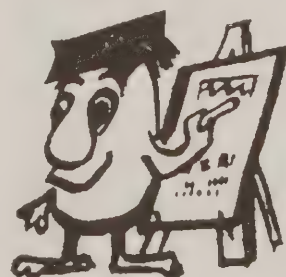
for others is warranted.

Pay attention to good operating procedures—other listeners need to know what is going on. They will particularly want to know if a contact has been finished, so that they can use the repeater without worrying about getting in the way of someone else's conversation. Keep in mind at all times why the repeater is there. In most cases, this will be voice communications. Non-voice modes on a voice repeater are not usual practice unless there are special circumstances—which usually means having discussed it previously with the repeater trustee. Digital modes (RTTY, AMTOR, Packet) are especially annoying to listen to and, of course, can't be deciphered without specialized equipment. Voice on data repeaters (not digipeaters) is considered OK if that repeater is the only one you can use to make contact. It's probably best not to make the QSO any longer than absolutely necessary; you will no doubt reach this conclusion fairly rapidly yourself once the data starts coming in over the top of your transmissions!

One way use (ie, where one or more stations are not heard on the repeater output) is not advisable. A quick call to request another station to go to another frequency is OK, but it is inconsiderate and confusing to others to keep up a one-way contact for any length of time. Use simplex and a dummy load where possible for the alignment and preliminary testing of equipment. Avoid the use of repeater input frequencies for this purpose.

NZART co-ordinates the repeater system and will generally only accept proposals for repeaters that meet the guidelines commonly accepted in New Zealand. The FMTAG is responsible to NZART for the maintenance of repeater technical standards and recommended channel allocations. All repeater systems in New Zealand require a licence from the New Zealand Radio Frequency Service.

Bear in mind that all the comments above apply specifically to New Zealand repeaters and there may be marked differences in the operation of overseas repeaters





and the procedures which you must use to work with them. Amateur radio is "on display" on repeaters more than anywhere else. Try to create as good an impression as possible.

#### Phone patches

Radio regulations and licence requirements should be carefully observed when using a phone patch. Non-amateurs are not permitted to control an amateur station.

Normal traffic handled is "brief personal" messages, not business or commercial, and ONLY within New Zealand.

Phone patch equipment requires proper authorization to permit its connection to the public switched telephone network.

#### Packet radio

Messages sent via Packet radio should be in the spirit and tradition of amateur radio and meet the requirements of the Radio Regulations.

Care should be taken when distributing hardware, software or publications via Packet radio as it may be interpreted by others as advertising or infringing the copyright of material originated by others.

#### Priorities on repeaters

Repeaters allow mobile and portable stations away from the luxuries of mains power supplies and sophisticated antenna systems to increase their range. Another important purpose is to facilitate emergency communications.

Amateur Radio Emergency Corps (AREC) operators are distinguished by the use of E (emergency) call-signs, for instance ZL2EMA. If you hear these stations, give them priority. Portable stations are those who are operating away from home, for example, a holidaymaker at a motor camp or a tramp in the ranges. They will identify themselves by using the word "portable" after the call-sign, eg: "This is ZL2QO portable listening seven-one-seven-five." If you hear these stations, give them priority—they may not have access to a telephone and could be needing to relay an urgent message. Mobile stations are actually on the move at the time of transmission. They may quite often be heard on their way to and from work at peak hours, and will identify themselves by saying: "This is ZL4HG mobile seven-ten." There are all sorts of variations on this basic theme, such as "pedestrian mobile" (on foot), "train mobile", "maritime mobile" (all at sea?) and even

"stationary mobile"—surely a contradiction in terms if ever there was one! Mobile stations may need to report breakdowns, traffic delays, traffic accidents or other urgent/important pieces of information, so should be given priority if heard.

Usually a mobile or portable station will not hog the repeater but will be listening for other stations who may need to use the frequency. With a little give and take there is plenty of room for all.

#### STSP Repeater

(Short Term Special Purpose repeater). A repeater designed for emergency use or during special events. An example is perhaps the need to provide communication for some local public event. It's important to note that the frequencies that protected so that the repeaters can be moved about with little chance of interference with other repeaters.

#### The three second rule

Three seconds should be left between each over to allow other stations to access the repeater. If another station calls, let them in straight away—they may have an urgent message to transmit.

#### Long QSOs on repeaters

Lengthy conversations on repeaters need to be approached with care. It would not be very thoughtful to tie up a repeater for a long time during rush hour or early evening when other people are likely to be wanting to use it. Late at night is best. Where available, a 70 cm repeater that's not part of the National System might be a better choice if there is less traffic on that band and less likelihood of getting in someone else's way. Make sure that you leave three second gaps for other traffic, and it may also be a good idea to leave longer gaps, such as 10 seconds, every so often. Bear in mind, too, that even though you may make every effort to allow other stations to use the repeater if they need to, many people would rather wait until you have finished altogether. If possible, break the conversation up into two or three shorter contacts and leave the repeater free in between them.

More of a nuisance than long QSOs are long overs, especially when there are inadequate gaps between them. At busy times, keep the overs short so as to allow others, possibly with urgent messages, to access the repeater

#### Checking the repeater input signal

Most radios these days have a setting called "repeater reverse", "monitor" or something similar which allows the operator to check the repeater input signal, ie, the frequency the other station is actually transmitting on. If you can hear this signal, it is a good indication that simplex contact with the station is possible.

#### Using simplex

Home station to home station contacts should be made on simplex where possible, thus leaving the repeaters free to facilitate mobile and portable communication.

Simplex is like carrying on a conversation at the back of a room: although fewer people will hear it, it is still not private. The same standards of language and content apply regardless of frequency.

There are eight designated FM simplex channels on both the 2 m and 70 cm bands. A list of simplex channels is given in this Call Book.



#### Channel terminology

Channels or

frequencies that are used on VHF/UHF are not normally named by all the numbers that make up the frequency. Instead, it is more common to use an abbreviated form of frequency for convenience. For example, the common simplex frequency of 146.525 MHz is referred to as six-five-two-five, where the rule is to omit the first two digits and the decimal point. The exception to this rule is where the frequency ends in zero, in which case the zero is omitted. For example, the frequency 147.000 MHz is referred to as seven-hundred, not seven-thousand.

#### Simplex and repeater signal reports

Many transceivers incorporate a signal strength meter (often called an S-meter). When you are listening to a transmission on simplex, the S-meter reading will give you an indication of how strong the station's signal is. With a repeater, the situation is quite different. The repeater signal strength remains constant, regardless of the transmitting station's signal strength. The degree of signal quieting varies instead—a strong input signal produces a clear, noise-free repeater output—described as "fully quieting" or "fully limiting"—while a weak signal will be noisy. If a signal falls below a certain level, it will not

hold the repeater reliably but will pulse it intermittently or drop out altogether.

Please remember that other stations rely on signal reports to determine how well their setup is working—try to make your signal reports as accurate as you can.

#### Other modes

FM is not the only mode used on VHF and UHF, in fact almost any mode can, and often is, used on these bands. For example, singleband (SSB) is used for weak signal and long-distance work towards the bottom end of the 2 m band. By contrast, CW or Morse is used for very exotic work such as earth-moon-earth (E-M-E) communication. As on all bands, you choose the mode that best suits your application and your desire for experimentation. You should be aware that many of the conventions we have outlined above for repeater operation may not necessarily apply to some of these exotic modes. As an extreme case, in E-M-E operation contacts are highly structured, based on very severe time constraints. The precise procedures for all the modes are beyond the scope of this article. They are covered in the recommended references.

#### The 6 m band

The 6 m band (50–54 MHz), lying between the highest high-frequency band and the 2 m VHF band, provides some exciting scope for experimentation into unusual modes of radio propagation. Communications over several thousands of kilometres is possible under favourable conditions, while at other times the band can seem dead.

This band lies close to the television Channel One, even overlapping part of this channel. For this reason a special MoC permit is required for operation in part of this band. You should consult a local Branch of NZART, FMTAG or known 6 m enthusiasts for details on the specific procedures before you begin operation.

#### Summary

Most of the special points relating to repeater use come under the category of commonsense considerations for others.

The Amateur's Code, first published in the ARRL Handbook, and reprinted in this Call Book, sums these up succinctly and we can do well to bear it in mind at all times.



# LEARNING THE MORSE CODE

On 17 June 2004, the Morse test was abolished as a requirement for the New Zealand Amateur license. It had been there from the very beginning, since the first Radio Regulations were Gazetted in 1923. Over the years, the speed required fluctuated, increasing to a high of 15 wpm for a "High frequency permit" in 1945, then dropping to 12, then finally to 5 wpm in December 2001. Its passing into history was viewed with regret and sadness by some, and with relief by others. But Morse will never die, and there will always be many who use it for contests and difficult DX contacts, and who prefer it to all other modes for its simplicity and beauty.

For those reasons, and because it played an overwhelmingly important part in our history, I recommend that you at least try it.

But despite what old timers may say, very few of us found learning to copy Morse code easy. Historical research shows that learning to copy 12 wpm requires an average of about 70 hours of study, but there are wide variations. On average, about 10 per cent of learners manage it in 10 hours or less, and another 10 per cent take more than 150 hours. A very few never achieve it no matter how long they persevere, and I am convinced that this is because they genuinely cannot not "make sense of the sounds" at all.

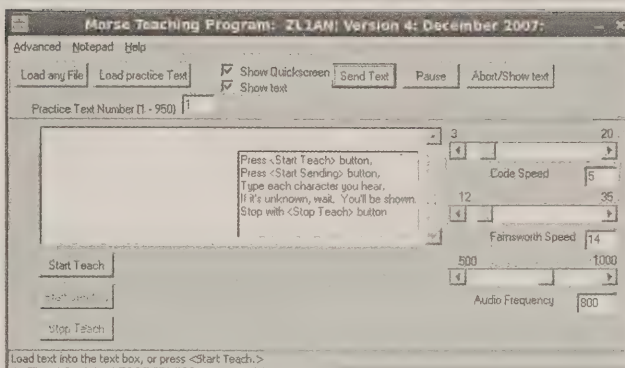
This should not surprise us. Some people are tone deaf, some cannot learn foreign languages, and some never get the hang of algebra. "Morse ability" seems to be little correlated with intelligence, musical ability, sex, age, or high achievement in other areas.

What is the "right way" to learn? All authorities agree that the very worst thing you can do is to memorize the code symbols from a printed chart. If you have one, never look at it again! Morse is an aural language, and must be learned by listening. This may surprise you, but the evidence is extensive and irrefutable.

I'm personally convinced that the very best way to learn is from a well-written computer program. Computers are patient, non-judgmental, and very good at keeping statistics.

A free program, written specifically for ZL learners, is available for downloading from the NZART website<sup>[1]</sup>.

You'll need a PC running Windows 95 through Windows 7. The methods used are based on scientific research, with



algorithms honed by feedback from users over 20 years. I know that it teaches Morse better than I can, and has got many people through Morse tests in several countries. If you have access to a computer, get it, and try it. Here are the download instructions:

- Go to the NZART website<sup>[1]</sup>.
- Click the link to "Exam information".
- Near the bottom of the page, in the text at item number 5, you'll see in the section "Learning the Morse Code", a green box saying "Teaching Software Filename:"
- Click on the blue words "instal-teach4.exe". You should be asked if you wish to save the installation file. Click "yes". It will come.
- Run the file. The program will install and start.

If you don't have a computer, your local NZART Branch may. In fact, these days older, used computers are so cheap that EVERY branch should have one for Morse practice, and for members to check out other Ham software.

There are other programs available, but some can't be recommended. If you have one that

- shows you visual symbols of the code
- teaches "opposites" (like "r" and "k") or "series" (like "eish5")
- gives only "random group" practice
- does not give you an ordered structure for learning
- teaches you to pass the US, UK or Canadian tests (which have a different format)
- sends characters at a speed less than 12 wpm

delete it immediately. A picture of the recommended program's operating window is shown in the figure. Everything is done by pushing buttons, as described in the comprehensive "help" file supplied. This tells you exactly how to start, continue, and work up to a reasonable operating speed.

"Farnsworth" Morse is used throughout, and should always be used for learning. This mode is named in honour of Russ Farnsworth, an early teacher who popularised the method, though he was not the first to use it. Characters are sent at a faster rate than for "correct" morse, with longer gaps between, to reinforce the learning of characters as "complete sound sequences", and not as an individually-perceived dits and dahs. Failure to teach this way is now recognised as the reason for the infamous "plateaus" that learners reached around 10-14 wpm, which old-timers mutter darkly about. Using Farnsworth Morse, this plateau is eliminated. The next one most people strike isn't usually reached until around 40-50 wpm!

However you proceed, you should learn the numbers at the same time as the letters. If you leave them "until later", they'll be harder because you won't have practiced them as much.

The program recommended above implements all of these features. The initial character teaching process is aural, and adaptive, with characters introduced at a rate governed by your own response from the keyboard, reinforced by a histogram display showing your progress. Several sessions will be necessary for this, but the program will give you a progress report at the end of each one, and you'll probably be surprised to see your ability continually improving.

Having learned the characters, 900 plain-language texts, similar to the old test texts, are provided for practice. Now you can start to write down the text. I recommend starting at an overall speed of 3 wpm, with Farnsworth speed 14 wpm, which gives you about two seconds "thinking time" between characters. Increase the overall speed as you gain proficiency, and when this reaches 14 wpm, you'll be hearing "correctly-spaced" Morse. As well as these texts, 50 "sample QSOs" are provided to help you get used to what you'll

hear on the HF bands.

Start sending practice only after you have the correct sound and rhythm of the characters firmly imprinted in your mind. Most of the candidates I examined in the last years of the Morse test had great difficulty attaining acceptable sending, because they started with the wrong grip, and sent with finger instead of wrist movement. A recommended procedure is given in the "Help" file of the teaching program above.

However, it's also helpful to see the correct way in use. An excellent YouTube video by a Japanese operator<sup>[2]</sup> shows you one method of learning, and what good code sounds like. He uses the "European" type key having a heavy, straight bar in common use in ZL. The "American" key, with slimmer, bent bar requires a different action. Many other videos show on the same page, some much better than others. Many have found it helpful to just listen to audio Morse while driving or doing the dishes. A virtually unlimited supply of this can be created with the free computer program "ebook2CW"<sup>[3]</sup>. This creates MP3 files from public-domain "ebooks" accessed by links on the same website. These include the complete works of Shakespeare!

Several excellent free Morse reading computer programs can also be downloaded from the web<sup>[4]</sup>. All these require reasonable code, good signal strength, and little fading and interference to decode well, but many have found that watching the words form on the screen while listening to them aids the learning process.

It's still possible to learn as we all did in the old days, by listening to Morse practice sessions on the local repeater, or on the bottom end of 80 m if you have an HF receiver. Listen around between 3.550 and 3.650 MHz between 7 and 8 pm for a week, and you'll probably hear some. They're easy to recognise because slow Morse is sent for a few minutes, followed by a "read-back" by the control station, and questions and comments by listeners.

How long, and how frequently, should you practice? Half an hour per day is fine. Some people find that before breakfast, when the mind is fresh, is better than in the evening. Others find that two or even three 20 minute sessions per day work best. In any case, stop when your mind begins to wander, or if you feel you're getting overwhelmed.



When you can cope with 10–12 wpm, try to have at least a few contacts on the air. Your reading doesn't have to be perfect! Most of us miss some characters or words because of conditions, or because the other operator goofs. You may find that CW becomes quite fascinating. You'll begin to recognise the different morse rhythms sent by straight keys,

bugs, keyers and the keyboards of the high-speed merchants, and learn to recognise the distinctive "fists" of regular operators—which become as distinctive as voices. You'll find that DX contacts with foreign stations are easy. Everybody has enough basic English for a CW contact, and many foreign stations operate almost exclusively on CW.

You'll also begin to find that you can read Morse faster than you can send it on a straight key. This is the time to invest in an electronic keyer and paddle. It is easy and cheap to construct a keyer yourself, using one of the many microprocessor-controlled chips available on the web. Paddles are not cheap, but again, you can make one yourself.

## References:

- 1 The NZART website is <http://www.nzart.org.nz/index.html>
- 2 View the video at <http://www.youtube.com/watch?v=ncOcg arGJHI&feature=related>
- 3 Download "ebook2cw" from <http://fkurz.net/ham/ebook2cw.html>
- 4 For code reading programs, see <http://www.dxsoft.com/>

# THE FIRST QSO

If you learned Morse from "plain language" English texts without doing much, or any, listening on the air, listening to real Ham CW conversations is initially a perplexing experience. It takes some time to get used to the conventions, the Q codes, the abbreviations, the background noise, and the interference. After a while, however, you'll realise that the first few overs are usually very stylised, especially between stations who have not made contact before. The "standard information" (name, QTH, signal report, maybe power, rig, antenna) is always exchanged in a similar manner, and critical bits are always repeated. Only after a couple of overs does the conversation become less formal, but even then most of us follow patterns.

## How should you go about it?

### Here are some suggestions

For your first QSO, it's a good idea to arrange a contact with some experienced local who will send good, slow Morse, with a strong enough signal to overcome the noise — which can be quite unsettling if you have listened only to noise-free code sent in practice sessions. During the contact, practise by sending the standard information just as you would to an unknown operator. Here is how the conversation might go. I have included the abbreviations you'll hear frequently, and which you'll need to become familiar with.

ZL1XYZ ZL1XYZ DE ZLIAN ZLIAN K ZLIAN DE ZL1XYZ—GE OM ES TNX FER CALL — RST 589 589 — NAME HR FRED FRED ES QTH HAMILTON HAMILTON HW K?  
ZLIAN DE ZL1XYZ K ZL1XYZ DE ZLIAN — GE FRED — RST 579 579 — NAME HR GARY GARY ES QTH AUCKLAND AUCKLAND HW K?  
ZL1XYZ DE ZLIAN K ZLIAN DE ZL1XYZ — R FB GARY — WX HR TODAY FINE ES TEMP 23—RG HR TS440 RUNNING 100W — ANT IS DIPOLE AT 10 METRES — HW K?  
ZLIAN DE ZL1XYZ K ZL1XYZ DE

ZLIAN R FB FRED — HR WX COLD BUT NO RAIN — RIG HR YAESU FT767GX — PWR 50W ES ANT END FED RANDOM WIRE WITH TUNER HI —BAND GUD TONITE — NO QRN OR QRM — HW K?  
ZL1XYZ DE ZLIAN K ZLIAN DE ZL1XYZ R FB GARY — TNX FER QSO — NW CULES 73 GARY GN OM — ZLIAN DE ZL1XYZ SK dit dit dit dit dit dit

Now at 12 wpm that exchange will have taken just over 10 minutes. That's plenty long enough for a start, so you can sign off gracefully. I guarantee you'll get a real buzz out of achieving that!

## Points to note

- Overs start and finish with the call-sign exchange, terminate with "K". Some operators insert "AR" before the last one, and finish with "KN" — which means "I don't want anybody to break in". But most of us enjoy having others enter our conversations.
- We used the most common standard abbreviations: GE, ON, ES, TNX, R FER, HR, HW, FB, WX, RIG, ANT, HI, W, GUD, NW, CUL, GN. "HI" is usually sent as "HEE". (dididit dit dit) If these are new to you, look them up in this Call Book. They'll rapidly become intuitive, and really save time.
- We used the most common Q-code and procedural signs QTH, QRM, QRN, QSO, RST.
- We exchanged information in a very stylised manner. Between friends or ragchewers conversations will be less formal, especially after the first few overs, but you won't go wrong proceeding in just this way, and many DX conversations sound just like this.
- We each ended with a pleasant "dit dit" to say goodbye — not necessary, but you'll often hear it. (Sometimes after an interesting conversation several other "dit dits" will sound, from phantom listeners

who have been following the conversation.)

Almost everybody initially finds it difficult to "send from the head" instead of reading from a text as you will probably have been doing in practice. Therefore, write down the first few overs you'll send at least in skeleton form, so you can send from the hard copy. You'll rapidly find that this also becomes unnecessary. You'll also probably find it more natural to initially write down everything received, as you will have been doing while learning. With experience you'll begin to "read in the head" and note down only call-signs, times, signal reports, names and items to comment on. Experienced operators write up the log as they go, but at first it's much easier to scribble details down on a scratch pad and complete the log carefully afterwards.

If the conversation continues longer, what do you say? CW operators talk about almost everything. Make two more lists: one of short phrases about your job, your age, your family, your other hobbies, other modes you operate. You should ask questions also: what is your job? Do you operate PSK31/MFSK16/ATV? How long have you been a ham? This may seem contrived, but it will get you going. After a while these memory joggers won't be necessary either.

On the DX bands you will often hear stations calling "CQ". Eventually you'll want to send one yourself. The "3 x 3" format is best, that is: CQ CQ CQ DE ZLIAN ZLIAN ZLIAN repeated three times, terminated with "K". Don't be one of those irritating people who send "CQ CQ ..." 25 times before giving a call-sign. Listeners get impatient and wander off. Short calls, repeated after a few seconds are best. If you call CQ, tune around a few kHz listening for answers, as somebody may have forgetfully left his RIT engaged, and be replying outside your passband. When 40m and above are open, DX contacts are easy, since ZL stations are held to be quite rare and everybody is happy to talk to

us. Such contacts are often quite short. Often you'll hear: "MY QSL SURE PS QSL VIA BURO" which means "I will certainly send you my QSL card, please send yours via the QSL bureau". Information regarding QSL Bureau procedure will be found elsewhere in the Call Book, and somebody at the local Branch will explain what to do.

If you answer a CQ the accepted polite thing to do is to send back at a speed no greater than that of the sending station—unless you know that the other operator is capable of higher speeds. If somebody answers you at speeds higher than you can comfortably receive, send back "PSE QRS 12 WPM"—or whatever speed you can copy. If the other station won't do this, just sign off gracefully and talk to somebody else. There are plenty of DX stations who send around this speed, and many, CQing faster, will gladly slow down to talk to you.

You will also hear conversations at higher speeds in the 20 – 35 wpm range. These operators generally use electronic keyers and send very good Morse. Listen to such contacts frequently and you'll find your reading speed slowly improves. Once you have the experience to read in this range, you'll find contacts very enjoyable as a surprising amount of information can be passed at these speeds, and the Morse is better. You can easily build an electronic keyer yourself. Microprocessor-controlled chips are cheap, widely available from the web, and require few additional components. Google on "youtube homebrew keyer paddle" and you'll see some interesting paddle suggestions. Many have found that watching Morse decode on a computer screen while listening is very helpful for improving their reading ability. The simplest Windows program to get going is "CWget", written by Sergei, UA9OSV<sup>[1]</sup>. Another is "CWdecoder", written by Grant, WD6CNF<sup>[2]</sup>. Experienced operators say that the best is "MRP40", written by Norbert Pieper<sup>[3]</sup>.

These require only a cable connecting the audio from the receiver to the soundcard input, and are straightforward to set up. You'll hear stations conversing at 30–60 wpm sending with Morse keyboards, although the operators will almost certainly be reading in their heads. Once you can copy at these speeds, the Morse, being perfect, is a delight to copy—it just “decodes itself”. Conversations at these speeds are typically much more in “plain language” with few abbreviations and included punctuation.

Sergei provides a companion morse keyboard sending program, “CWtype”, while Grant’s reading program has a keyboard included. Both were designed to interface with the transmitter keying circuit via a simple interface connected to a printer or com port. But most modern computers have only USB ports, which are far more complicated to drive. Sergei recommends using one of several different commercial interfaces—see his website—which usually allow operation on several other modes as well. But this is

an added expense, and Dennis, KF3AD published an alternative interface in QST January 2007 which generates logical Morse from the soundcard audio. You can download his article from the web<sup>[4]</sup>. Come down and join the regulars on the bottom end of 80 metres! We'll be glad to talk to you!

<sup>[2]</sup> Download “CWdecoder” from <http://www.amqrp.org/projects/cwdecod/cwdecod.htm>  
<sup>[3]</sup> Download “MRP-40” from <http://www.polar-electric.com/Morse/MRP40-EN/index.htm>  
<sup>[4]</sup> See the sound-card to logic article at [http://www.polar-electric.com/Morse/TX\\_via\\_Soundcard.pdf](http://www.polar-electric.com/Morse/TX_via_Soundcard.pdf)

References

<sup>[1]</sup> Download “CWget” from <http://www.dxsoft.com/en/downloads/>

ABBREVIATIONS FOR CW WORK

ABT	About	OB	Old boy
AGN	Again	OC	Old chap
ANT	Antenna	OM	Old man
AR K	End of transmission	OP; OPR	Operator
AR VA	Final end of transmission	OT	Old timer; Old top
AS	Wait		
BCI	Broadcast interference	PSE;	Please
BCL	Broadcast listener	PWR	Power
BK	Break; I wish to break-in (interrupt) a transmission in progress	R	Received as transmitted; are (sometimes also used as a decimal point, e.g. 1R5)
BN	All between; been	RCVR; RX	Receiver
BUG	Semi-automatic key	REF	Refer to; Referring to; Reference
B4	Before	RFI	Radio frequency interference
C	Yes	RIG	Station equipment
CL	I am closing my station; call	RPRT, REPT	Report
CPI, CPY	Copy	RPT	Repeat; I repeat
CQ	Calling any station	RTT; RTTY	Radioteletype
CUAGN	See you again	RX; RCVR	Receiver
CUD	Could		
CUL	See you later	SA	Say
CW	Continuous wave, i.e. radio telegraphy	SASE	Self-addressed, stamped envelope
DE	From	SED	Said
DR	Dear	SIG	Signal
DX	Distance, foreign countries	SKED	Schedule
ER	Here	SRI	Sorry
ES	And; &	SSB	Single sideband
FB	Fine business, excellent	SUM	Some
FER	For	T	Zero (0)
FM	Frequency modulation; From	THO	Though
GA	Go ahead, continue sending; good afternoon	THRU; THRO	Through
GB	Goodbye	TMW	Tomorrow
GE	Good evening	TNX; TKS	Thanks
GG	Going; grounded grid	TT	That
GM	Good morning	TU; TKU	Thank you
GN	Good night	TVI	Television interference
GND	Ground	TX	Transmitter
GUD	Good	TXT	Text
HI	Laughter; High	U	You
HPE	Hope	UR	Your; You are (sometimes YR)
HR	Here; Hear; Hour	URS	Yours (sometimes YRS)
HV; HVE	Have	VFO	Variable frequency oscillator
HW	How	VY	Very
K	Go ahead	WID	With
KN	specific station go ahead	WKD; WKG	Worked; Working
MA; MILS	Milliamperes	WL	Well; Will
MNI	Many	WUD	Would
MSG	Message	WX	Weather
N	No; North	XCVR	Transceiver
NCS	Net control station	XMTR; TX	Transmitter
ND	Nothing doing	XTAL	Crystal
NIL	Nothing; I have nothing for you	XYL; YF	Wife
NR	Number	YL	Young lady
NW	Now	73	Best Regards
		88	Love and kisses



# THE Q-CODE

QRG	Will you tell me my exact frequency (or that of ...)? Your exact frequency (or that of ...) is ... kHz.	QSB	Are my signals fading? Your signals are fading.
QRH	Does my frequency vary? Your frequency varies.	QSD	Are my signals mutilated? Your signals are mutilated.
QRI	How is the tone of my transmission? The tone of your transmission is ... (1. Good; 2. Variable; 3. Bad)	QSK	Can you hear me between your signals and if so can I break in on your transmission? I can hear you between my signals; break in on my transmission.
QRK	What is the intelligibility of my signals (or those of ...)? The intelligibility of your signals (or those of ...) is ... (1. Bad; 2. Poor; 3. Fair; 4. Good; 5. Excellent)	QSL	Can you acknowledge receipt? I am acknowledging receipt.
QRL	Are you busy? I am busy (or I am busy with ...) Please do not interfere.	QSM	Shall I repeat the last message I sent you, or some previous message? Repeat the last message which you sent me [or message(s) number(s) ...]
QRM	Is my transmission being interfered with? Your transmission is being interfered with ... (1. Nil; 2. Slightly; 3. Moderately; 4. Severely; 5. Extremely)	QSN	Did you hear me (or ...) on ... kHz? I did hear you (or ...) on ... kHz.
QRN	Are you troubled by static? I am troubled by static ... (1-5 as under QRM)	QSO	Can you communicate with ... direct or by relay? I can communicate with ... direct (or by relay through ...)
QRO	Shall I increase power? Increase power.	QSP	Will you relay to ...? I will relay to ...
QRP	Shall I decrease power? Decrease power.	QST	General call preceding a message addressed to all amateurs and ARRL members.
QRQ	Shall I send faster? Send faster (... wpm).	QSU	Shall I send or reply on this frequency (or ... kHz)? Send or reply on this frequency (or ... kHz).
QRS	Shall I send more slowly? Send more slowly (... wpm)	QSV	Shall I send a series of Vs on this frequency (or on ... kHz)? Send a series of Vs on this frequency (or on ... kHz)
QRT	Shall I stop sending? Stop sending.	QSW	Will you send on this frequency (or on ... kHz)? I am going to send on this frequency (or on ... kHz)
QRU	Have you anything for me? I have nothing for you.	QSX	Will you listen to ... on ... kHz? I am listening to ... on ... kHz.
QRV	Are you ready? I am ready.	QSY	Shall I change to transmission on another frequency? Change to transmission on another frequency (or on ... kHz).
QRW	Shall I inform ... that you are calling him on ... kHz? Please inform ... that I am calling on ... kHz.	QSZ	Shall I send each word or group more than once? Send each word or group twice (or ... times).
QRX	When will you call me again? I will call you again at ... hours (on ... kHz).	QTC	How many messages have you to send? I have ... messages for you (or for ...)
QRZ	Who is calling me? You are being called by ... (on ... kHz)	QTH	What is your location? My location is ... (QTHR—Location as per Call Book)
QSA	What is the strength of my signals (or those of ...)? The strength of your signals (or those of ...) is ... (1. Scarcely perceptible; 2. Weak; 3. Fairly good; 4. Good; 5. Very good)	QTR	What is the correct time? The time is ...

## Morse Alphabet

A	• —	N	— •
B	— • • •	O	— — —
C	— • — •	P	• — — •
D	— • •	Q	— — — •
E	•	R	• — •
F	• • — •	S	• • •
G	— — •	T	—
H	• • • •	U	• • —
I	• •	V	• • • —
J	• — — —	W	• — —
K	— • —	X	— • • —
L	• — • •	Y	— • — —
M	— —	Z	— — • •

## Numerals

1	• — — — —	6	— • • • •
2	• • — — —	7	— — • • •
3	• • • — —	8	— — — • •
4	• • • • —	9	— — — — •
5	• • • • •	0	— — — — —

## Procedure Signals

Full stop	(.) • — • — • —
Comma	(,) — — • — —
Colon	(:) — — — • •
Question mark/Repeat	(?) • • — — • •
Apostrophe	(') • — — — — •
Hyphen/dash	(-) — • • • • —
Fraction bar	(/) — • • • •
Parenthesis (left hand)	(( ) — • — — •
Parenthesis (right hand)	( ) — — — • —
Quotation marks	(“) • — • • • •
Error	• • • • • • • •

## Spacing and length of signal

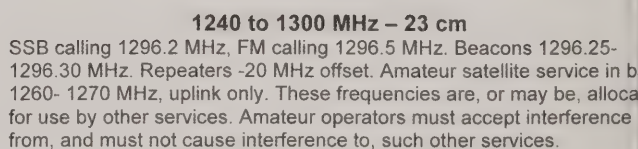
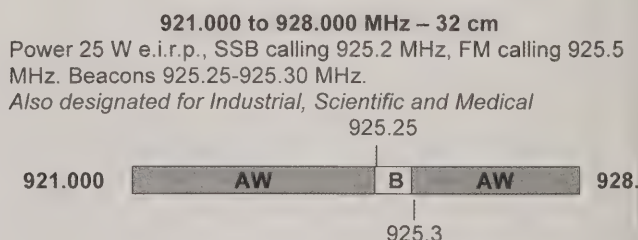
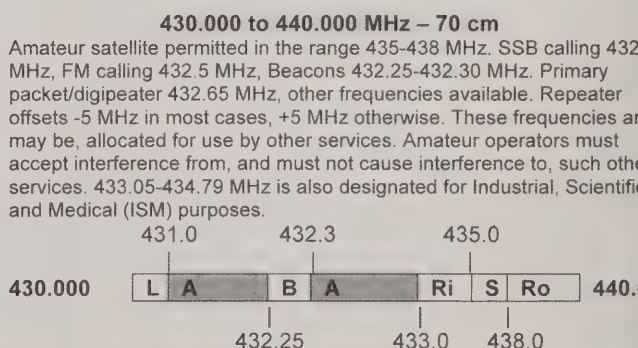
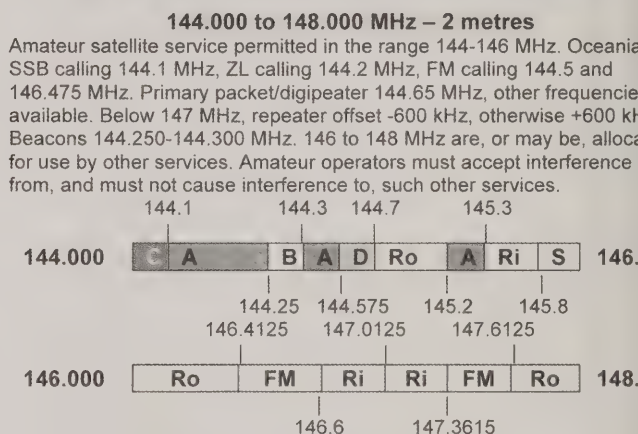
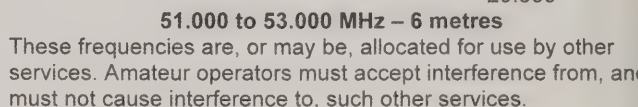
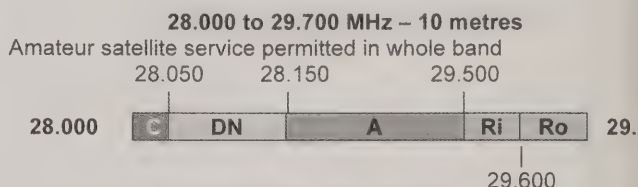
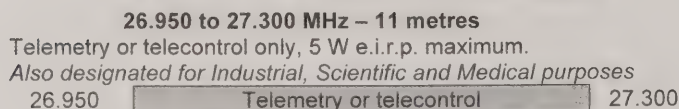
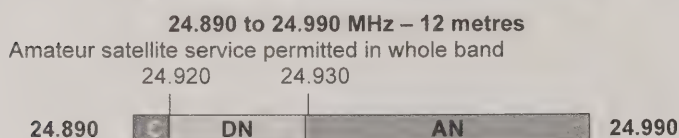
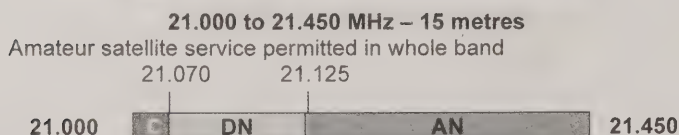
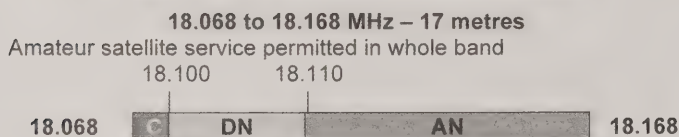
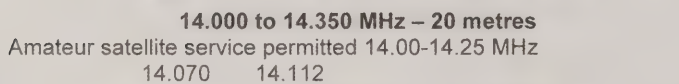
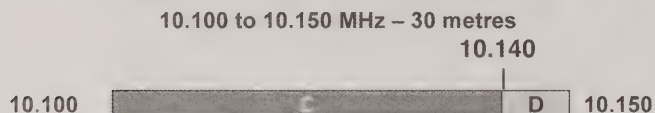
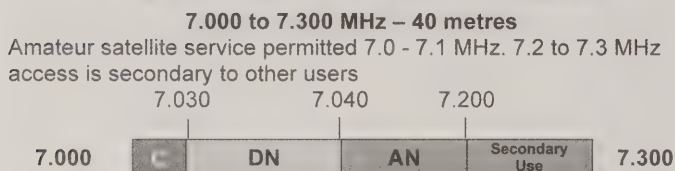
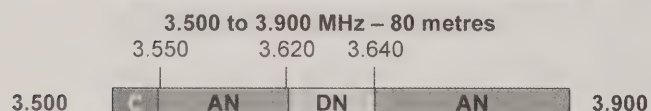
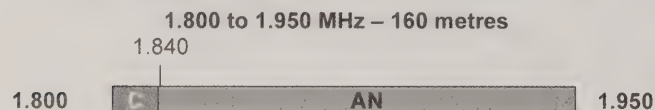
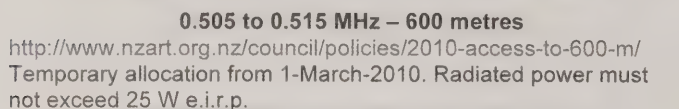
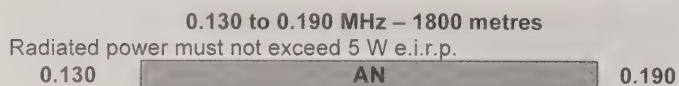
1. A dash is equal to three dots.
2. The space between the signals which form the same letter is equal to one dot.
3. The space between two letters is equal to three dots.
4. The space between two words is equal to seven dots.

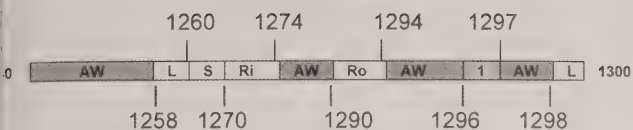
Azores, Cape Verde	11pm	Mid Night	1am	2am	3am	4am	5am	6am	7am	8am	9am	10am	11am	Noon	1pm	2pm	3pm	4pm	5pm	6pm	7pm	8pm	9pm	10pm
Fernando de Horonha	10pm	11pm	Mid Night	1am	2am	3am	4am	5am	6am	7am	8am	9am	10am	11am	Noon	1pm	2pm	3pm	4pm	5pm	6pm	7pm	8pm	9pm
Greenland, Rio de Janiero, Brazil	9pm	10pm	11pm	Mid Night	1am	2am	3am	4am	5am	6am	7am	8am	9am	10am	11am	Noon	1pm	2pm	3pm	4pm	5pm	6pm	7pm	8pm
Atlantic Standard Time, Chile, Nova Scotia	8pm	9pm	10pm	11pm	Mid Night	1am	2am	3am	4am	5am	6am	7am	8am	9am	10am	11am	Noon	1pm	2pm	3pm	4pm	5pm	6pm	7pm
Eastern Standard Time, Montreal, New York, Peru	7pm	8pm	9pm	10pm	11pm	Mid Night	1am	2am	3am	4am	5am	6am	7am	8am	9am	10am	11am	Noon	1pm	2pm	3pm	4pm	5pm	6pm
Central Standard Time, Chicago, Costa Rica	6pm	7pm	8pm	9pm	10pm	11pm	Mid Night	1am	2am	3am	4am	5am	6am	7am	8am	9am	10am	11am	Noon	1pm	2pm	3pm	4pm	5pm
Mountain Standard Time, Calgary, Denver, Phoenix	5pm	6pm	7pm	8pm	9pm	10pm	11pm	Mid Night	1am	2am	3am	4am	5am	6am	7am	8am	9am	10am	11am	Noon	1pm	2pm	3pm	4pm
Pacific Standard Time, Los Angeles, Seattle, Juneau	4pm	5pm	6pm	7pm	8pm	9pm	10pm	11pm	Mid Night	1am	2am	3am	4am	5am	6am	7am	8am	9am	10am	11am	Noon	1pm	2pm	3pm
Eastern Alaska, Dawson	3pm	4pm	5pm	6pm	7pm	8pm	9pm	10pm	11pm	Mid Night	1am	2am	3am	4am	5am	6am	7am	8am	9am	10am	11am	Noon	1pm	2pm
Hawaiian Islands	2pm	3pm	4pm	5pm	6pm	7pm	8pm	9pm	10pm	11pm	Mid Night	1am	2am	3am	4am	5am	6am	7am	8am	9am	10am	11am	Noon	1pm
Nome, Alaska, Samoa, Midway Islands	1pm	2pm	3pm	4pm	5pm	6pm	7pm	8pm	9pm	10pm	11pm	Mid Night	1am	2am	3am	4am	5am	6am	7am	8am	9am	10am	11am	Noon
International Date Line, Fiji Islands, New Zealand Standard Time	Noon	1pm	2pm	3pm	4pm	5pm	6pm	7pm	8pm	9pm	10pm	11pm	Mid Night	1am	2am	3am	4am	5am	6am	7am	8am	9am	10am	11am
New Caledonia	11am	Noon	1pm	2pm	3pm	4pm	5pm	6pm	7pm	8pm	9pm	10pm	11pm	Mid Night	1am	2am	3am	4am	5am	6am	7am	8am	9am	10am
Eastern Australia, Melbourne, Sydney	10am	11am	Noon	1pm	2pm	3pm	4pm	5pm	6pm	7pm	8pm	9pm	10pm	11pm	Mid Night	1am	2am	3am	4am	5am	6am	7am	8am	9am
Central Australia, Tokyo Japan	9am	10am	11am	Noon	1pm	2pm	3pm	4pm	5pm	6pm	7pm	8pm	9pm	10pm	11pm	Mid Night	1am	2am	3am	4am	5am	6am	7am	8am
Philippine Islands Perth Australia	8am	9am	10am	11am	Noon	1pm	2pm	3pm	4pm	5pm	6pm	7pm	8pm	9pm	10pm	11pm	Mid Night	1am	2am	3am	4am	5am	6am	7am
Laos, Sumatra, Thailand	7am	8am	9am	10am	11am	Noon	1pm	2pm	3pm	4pm	5pm	6pm	7pm	8pm	9pm	10pm	11pm	Mid Night	1am	2am	3am	4am	5am	6am
Calcutta, Novosibirsk Russia, Bangladesh	6am	7am	8am	9am	10am	11am	Noon	1pm	2pm	3pm	4pm	5pm	6pm	7pm	8pm	9pm	10pm	11pm	Mid Night	1am	2am	3am	4am	5am
Central Russia, Pakistan	5am	6am	7am	8am	9am	10am	11am	Noon	1pm	2pm	3pm	4pm	5pm	6pm	7pm	8pm	9pm	10pm	11pm	Mid Night	1am	2am	3am	4am
Mauritius, Oman, Reunion Island	4am	5am	6am	7am	8am	9am	10am	11am	Noon	1pm	2pm	3pm	4pm	5pm	6pm	7pm	8pm	9pm	10pm	11pm	Mid Night	1am	2am	3am
Arabia, Iraq, Eastern Europe, Moscow, Ethiopia, Malagasy	3am	4am	5am	6am	7am	8am	9am	10am	11am	Noon	1pm	2pm	3pm	4pm	5pm	6pm	7pm	8pm	9pm	10pm	11pm	Mid Night	1am	2am
Athens, Cape Town, Cairo	2am	3am	4am	5am	6am	7am	8am	9am	10am	11am	Noon	1pm	2pm	3pm	4pm	5pm	6pm	7pm	8pm	9pm	10pm	11pm	Mid Night	1am
Central Europe, Berlin, Geneva, Stockholm, Vienna	1am	2am	3am	4am	5am	6am	7am	8am	9am	10am	11am	Noon	1pm	2pm	3pm	4pm	5pm	6pm	7pm	8pm	9pm	10pm	11pm	Mid Night
Greenwich Meridian Time, London, England	0000	0100	0200	0300	0400	0500	0600	0700	0800	0900	1000	1100	1200	1300	1400	1500	1600	1700	1800	1900	2000	2100	2200	2300



# NEW ZEALAND AMATEUR RADIO BANDPLANS P1 OF 2

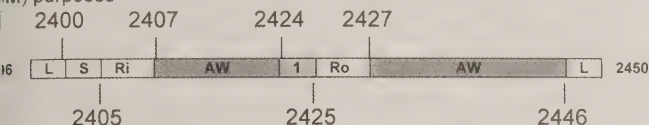
These charts show the New Zealand bandplans. These bandplans are to ensure that your transmissions do not impose problems on other operators and that their transmissions do not impact on you. It is to the advantage of all operators that the published bandplans be used. The Ministry of Economic Development (MED) defines the band limits, while the internal band segments are derived from the IARU Region 3 bandplans with New Zealand adaptations. The band limits are found in Radiocommunications Regulations (General User Radio Licence for Amateur Radio Operators) on the NZART Web site <http://www.nzart.org.nz/exam/gurl/> and at each end of the band blocks as shown below. The IARU Region 3 bandplans, developed to meet international requirements, are at the IARU Region 3 web site. <http://www.iaru-r3.net/r3bandplan.doc>





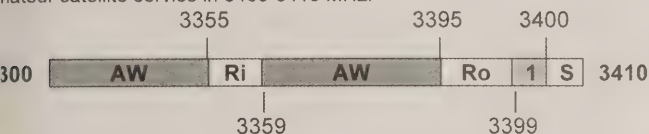
### 2396 to 2450 MHz – 12 cm

Standard 1 MHz narrow band segment 2424-2425 MHz. SSB calling 24.2 MHz, FM calling 2424.5 MHz. Beacons 2424.25-2424.30 MHz. Repeaters - 20 MHz offset. Amateur satellite service in 2400-2450 MHz. 2400-2450 MHz is also designated for Industrial, Scientific and Medical (ISM) purposes



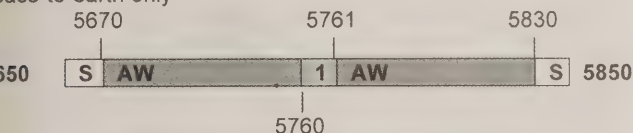
### 3300 to 3410 MHz – 9 cm

Amateur satellite service in 3400-3410 MHz.



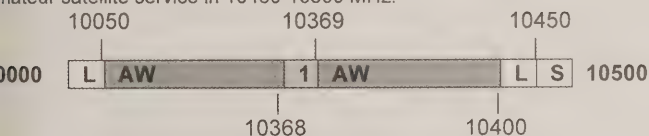
### 5650 to 5850 MHz – 5 cm

Satellites 5650-5670 MHz earth-to-space only; 5830-5850 MHz space-to-earth only



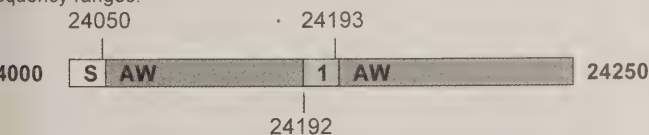
### 10 000 to 10 500 MHz – 3 cm

Amateur satellite service in 10450-10500 MHz.



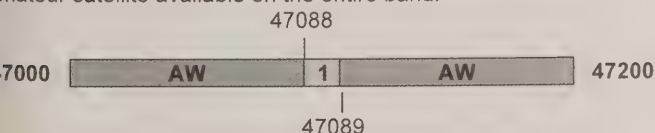
### 24 000 to 24 250 MHz – 1.2 cm

Amateur satellite service in 24000-24050 MHz. Also designated for industrial, scientific and medical (ISM) purposes. These frequencies may also be allocated to Short Range Device (SRD) services. Amateur operators must accept interference from ISM and SRD services within these frequency ranges.



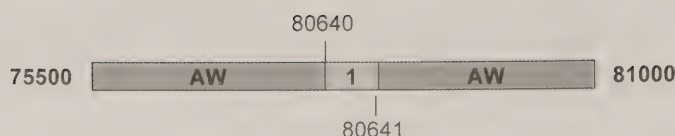
### 47 000 to 47 200 MHz – 6 mm

Amateur satellite available on the entire band.



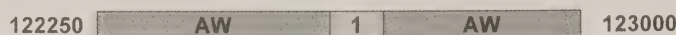
### 75 500 to 81 000 MHz – 4 mm

Amateur satellite available on the entire band. These frequencies are, or may be, allocated for use by other services. Amateur operators must accept interference from, and must not cause interference to, such other services.



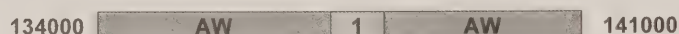
### 122250 to 123000 MHz – 2.4 mm

Also designated for industrial, scientific and medical (ISM) purposes. These frequencies may also be allocated to Short Range Device (SRD) services. Amateur operators must accept interference from ISM and SRD services within these frequency ranges. These frequencies are, or may be, allocated for use by other services. Amateur operators must accept interference from, and must not cause interference to, such other services.



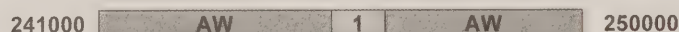
### 134000 to 141000 MHz – 2.1mm

Amateur satellite available on the entire band. 136000 to 141000 MHz are, or may be, allocated for use by other services. Amateur operators must accept interference from, and must not cause interference to, such other services.



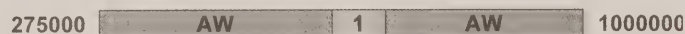
### 241000 to 250000 MHz – 1.2mm

Amateur satellite available on the entire band. 241000 to 248000 MHz are, or may be, allocated for use by other services. Amateur operators must accept interference from, and must not cause interference to, such other services. 244000 to 246000 MHz also designated for industrial, scientific and medical (ISM) purposes. These frequencies may also be allocated to Short Range Device (SRD) services. Amateur operators must accept interference from ISM and SRD services within these frequency ranges.



### 275000 to 1000000 MHz – 1mm to 0.3mm

Allocated to the amateur service on a temporary basis until further notice. These frequencies are, or may be, allocated for use by other services. Amateur operators must accept interference from, and must not cause interference to, such other services.



### KEYS:

<b>C</b>	= CW or modes less than 1 kHz bandwidth
<b>A</b>	= All modes with bandwidth less than 16 kHz
<b>AN</b>	= All modes with bandwidth less than 6 kHz
<b>AW</b>	= All modes
<b>D</b>	= Data modes with bandwidth less than 16 kHz
<b>DN</b>	= Data modes with bandwidth less than 6 kHz
<b>1</b>	= Standard 1 MHz narrow band segment
<b>T</b>	= Telemetry or telecontrol only – 11 metres
<b>Ri</b>	= Repeater input band segment
<b>Ro</b>	= Repeater output band segment

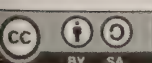
B = Beacons, FM = FM simplex, S = Satellites, L = Link

**NOTES:** 1. The frequencies at each end of the band blocks are the band limit frequencies;

2. The frequency, giving a point in a band, can be aligned in the centre or at the first or last digit;

3. Amateur TV Bands are subject to further notice.

To find the narrow band segment bandplan for the microwave bands, please look for *Simplex and Calling Frequencies* that can be found elsewhere in this Call Book



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 New Zealand Association of Radio Transmitters  
 Information as at August 2012



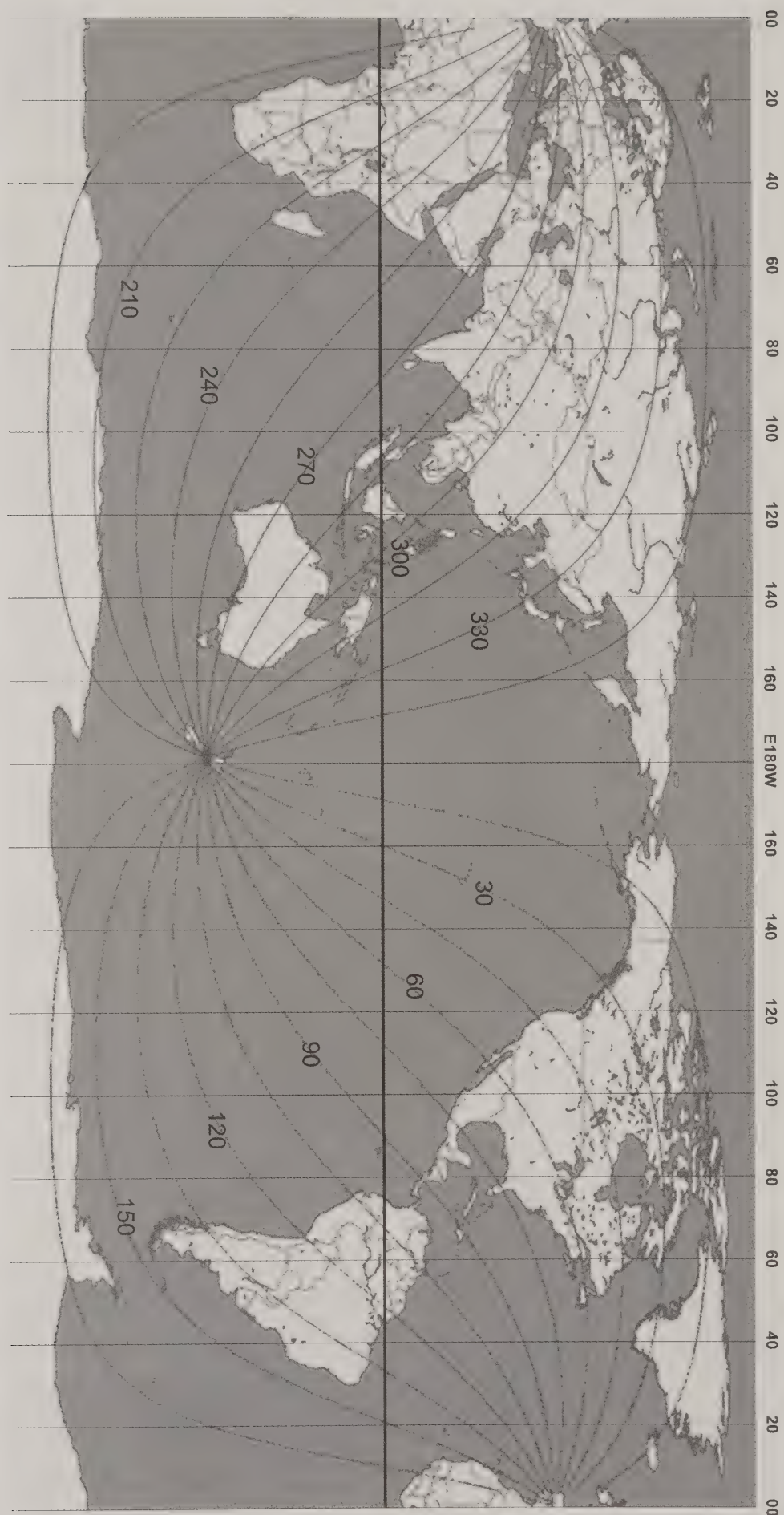
Listed below are the approximate short path bearings based on the great circle map centred on Wellington. These listings, based on true north, will allow you to aim your directional antenna in the appropriate direction before final adjustment depending on reception. The long path bearings are about 180 degrees in the opposite direction. There are several programmes which allow you to plot and save great circle maps either in polar or rectangular format and centred on any location. These include "Pizza" ([www.TonneSoftware.com](http://www.TonneSoftware.com)), "GcmWin" ([www.osl.net/sm3esi](http://www.osl.net/sm3esi)) and an online version at [www.gcmapp.com](http://www.gcmapp.com) in rectangular format.

4-12 NEW ZEALAND ASSOCIATION OF RADIO TRANSMITTERS (INC.)

ISO,IMO	Sardinia	268	88	18794	40	-9	TK	Corsica	279	99	18818	42	-9
J2	Djibouti	249	69	14313	12	-43	TL	Central Africa	216	36	15305	4.5	-18
J3	Grenada	104	284	13647	12	61.8	TN	Congo (Republic of the)	207	27	14566	-4	-15
J5	Guinea-Bissau	161	341	16609	12	15	TR	Gabon	201	21	15248	0.5	-9
J6	St. Lucia	103	283	13859	14	61	TT	Chad	217	37	16197	12	-15
J7	Dominica	101	281	13935	15.4	61.3	TU	Cote d' Ivoire	182	2	16022	5.5	4
J8	St. Vincent	103	283	13783	13.3	61.3	TY	Benin	193	13	16042	6.3	-2.3
JA-JS,7J-7N	Japan	332	152	9267	35.7	-139.8	TZ	Mali	174	354	16845	13	8
JD1	Minami Torishima	340	160	7670	25	-154	UA-UII,	European Russia	312	132	16384	56	-40
JD1	Ogasawara	340	160	7670	25	-154	3,4,6RA-RZ						
JT-JV	Mongolia	320	140	11941	48	-107	UA2,RA2	Kaliningrad	318	138	17583	55	-20.5
JW	Svalbard	353	173	15810	78	-16	UA-UI8,	Asiatic Russia	316	136	13737	55	-83
JX	Jan Mayen	2	182	16695	71	8	9,0RA-RZ						
JY	Jordan	268	88	16221	32	-36	UJ-UM	Uzbekistan	293	113	14325	40	-64
K,W,N,	United States of America	54	234	11174	33.5	112	UN-UQ	Kazakhstan	312	132	14065	53	-76
AA-AK							UR-UZ,	Ukraine	303	123	17053	50.5	-31
EM-EO													
KG4	Guantanamo Bay	87	267	13113	20	75	V2	Antigua & Barbuda	101	281	14172	17	59.8
KH0	Mariana Island	329	149	7020	16	-146	V3	Belize	81	261	11839	17.5	88.3
KH1	Baker & Howland Island	14	194	4735	0.5	176	V4	St. Kitts & Nevis	98	278	13962	17.3	62.6
KH2	Guam	327	147	6862	14	-145	V5	Namibia	202	22	12558	-22.6	-17.1
KH3	Johnston Island	17	197	6664	17	170	V6	Micronesia	339	159	5738	8	-158
KH4	Midway Island	7	187	7740	28	177.5	V7	Marshall Island	350	170	5666	9.2	-167
KH5	Palmyra & Jarvis Island	30	210	5761	6	162	V8	Brunei Darussalam	295	115	7931	5	-115
KH5K	Kingman Reef	29	209	5891	7.5	162.6	VA-VG,VO,VY	Canada	46	226	13081	50	100
KH6,7	Hawaii	30	210	7446	20	156	VK,AX	Australia	273	93	4182	-30	-130
KH7K	Kure Island	6	186	7785	28.5	178.5	VK0	Heard Island	221	41	7115	-53	-73.4
KH8	American Samoa	29	209	3329	-14	171	VK0	Macquarie Island	221	41	7115	-53	-73.4
KH8	Swains Island	29	209	3329	-14	171	VK9C	Cocos (Keeling) Island	269	89	8111	-12.2	-96.8
KH9	Wake Island	352	172	6747	19	-167	VK9L	Lord Howe Island	303	123	1762	-31.6	-159.1
KL,AL,NL,WL	Alaska	16	196	12101	64	150	VK9M	Melish Reef	320	140	3193	-17.6	-155.8
KP1	Navassa Island	89	269	12978	18	75	VK9N	Norfolk Island	334	154	1497	-29	-168
KP2	Virgin Island	96	276	13853	18	64.5	VK9W	Willis Island	312	132	3709	-16	-149.5
KP3,4	Puerto Rico	94	274	13746	18.5	66.2	VK9X	Christmas Island	276	96	7490	-10.5	-105.7
KP5	Descheo Island	94	274	13624	18.3	67.5	VP2E	Anguilla	97	277	13998	18.3	63
LA-LN	Norway	338	158	17652	60	-10.7	VP2M	Montserrat	99	279	13960	16.8	62.2
LO-LW	Argentina	138	318	10028	-34	58.4	VP2V	British Virgin Island	96	276	13873	18.4	64.6
LX	Luxembourg	317	137	18746	49	-6.5	VP5	Turks & Caicos Island	87	267	13496	22	72
LY	Lithuania	314	134	17314	54.5	-25.5	VP6	Pitcairn Island	88	268	5335	-25.1	130.1
LZ	Bulgaria	283	103	17651	42.7	-23.3	VP6	Ducie Island	88	268	5335	-25.1	130.1
OA-OC	Peru	111	291	10591	-12	77	VP8	Falkland Island	149	329	8371	-52	60
OD	Lebanon	270	90	16357	33.9	-35.5	VP8,LU	South Georgia Island	162	342	8988	-54	37
OE	Austria	302	122	18144	48.2	-16.3	VP8,LU	South Orkney Island	162	342	8988	-54	37
OF-OI	Finland	326	146	17060	60.2	-25	VP8,LU	South Sandwich Island	162	342	8988	-54	37
OH0	Aland Island	329	149	17285	60.2	-20	VP8,LU,CE9,	South Shetland Island	156	336	7576	-62	58.5
OJ0	Market Reef	330	150	17320	60.3	-19	HF0,4K1						
OK-OL	Czech Republic	310	130	18198	50.1	-14.4	VP9	Bermuda	81	261	14719	32.3	64.7
OM	Slovak Republic	308	128	18094	50.1	-16	VQ9	Chagos Island	256	76	10484	-7.3	-72.4
ON-OT	Belgium	329	149	18702	50.9	-4.4	VR	Hong Kong	306	126	9449	22.5	-114
OU-OW,OZ	Denmark	327	147	17942	55.7	-12.6	VU	India	285	105	12043	23	-80
OX	Greenland	35	215	16138	63	52	VU4	Andaman & Nicobar Island	284	104	9974	10	-94
OY	Faroe Island	2	182	17696	62	7	VU7	Lakshadweep Island	268	88	11962	10	-70
P2	Papua New Guinea	315	135	4752	-7	-146	XA-XI	Mexico	70	250	11511	24	98
P4	Aruba	97	277	13010	12.5	70	XA4-XI4	Revillagigedo	66	246	9985	18	112
P5	DPR of Korea	325	145	10121	39	-127.5	XT	Burkina Faso	187	7	16761	12.3	1.7
PA-PI	Netherlands	332	152	18548	52.4	-4.9	XU	Cambodia	292	112	9215	11.5	-105
PJ2	Curacao	98	278	13057	12	69	XW	Laos	295	115	9913	18	-102.5
PJ4	Bonaire	98	278	13057	12	69	XX9	Macao	306	126	9407	22	-114
PJ5,6	Saba & St. Eustatius	97	277	13978	18	63	XY-XZ	Myanmar	290	110	10323	16.8	-96
PJ7	St. Maarten	97	277	13978	18	63	YA,T6	Afghanistan	285	105	13825	32	-65
PP-PY,ZV-ZZ	Brazil	144	324	11856	-23	43.2	YB-YH	Indonesia	280	100	7713	-6	-107
PP0-PY0F	Fernando de Noronha	144	324	14383	-3	32	YI	Iraq	275	95	15563	33	-44.5
PP0-PY0S	St. Peter & St. Paul Rocks	144	324	14930	1.5	30	YJ	Vanuatu	344	164	2667	-18	-168
PP0-PY0T	Trindade & Martim Vaz Island	153	333	12549	-21	32	YK	Syria	271	91	16278	34	-36.5
PZ	Suriname	123	303	12715	-6	55	YL	Latvia	320	140	17287	57	-24
RI/F	Franz Josef Land	348	168	15156	80	-50	YN,H6-7,HT	Nicaragua	87	267	11642	12	86
S0	Western Sahara	230	50	17467	25	-14	YO-YR	Romania	288	108	17441	44.4	-26.1
S2	Bangladesh	292	112	11281	24	-90.5	YS,HU	El Salvador	83	263	11534	14	89
S5	Slovenia	295	115	18325	46.1	-14.6	YT-YU	Serbia	290	110	17884	44.9	-20.5
S7	Seychelles	247	67	12039	-4	-56	YV-YY,4M	Venezuela	101	281	13112	10.5	67
S9	Sao Tome & Principe	197	17	15308	0.3	-6	YV0	Aves Island	99	279	13181	12	67.5
SA-SM,	Sweden	329	149	17431	59.3	-18.1	Z2-	Zimbabwe	217	37	12431	-18	-31
7S-8S							Z3	Macedonia	290	110	17884	44.9	-20.5
SN-SR	Poland	305	125	17829	50	-20	Z8	South Sudan (Rep of)	232	52	14600	6.8	-30.5
ST	Sudan	243	63	15390	15.5	-32.5	ZA	Albania	279	99	17946	41.5	-19.5
SU	Egypt	261	81	16494	30	-31.4	ZB2	Gibraltar	178	358	19412	36	5.5
SV-SZ,J4	Greece	271	91	17510	38	-23.7	ZC4	UK Sov. Base Areas on Cyprus	271	91	16616	35	-33
SVA	Mount Athos	277	97	17624	40.2	-24.3	ZD7	St. Helena	179	359	13634	-16	6
SV5,J45	Dodecanese	270	90	17138	36.5	-27.5	ZD8	Ascension Island	169	349	14451	-8	14
SV9,J49	Crete	266	86	17284	35.4	-25.2	ZD9	Tristan da Cunha & Gough Island	174	354	11272	-37	12.3
T2	Tuvalu	7	187	3640	-8.7	-178.6	ZF	Cayman Island	84	264	12564	19.5	81.2
T30	W. Kiribati (Gilbert Island)	0	180	4143	-4	-175	ZK2	Niue	35	215	2866	-19	170
T31	C. Kiribati (British Phoenix Is)	23	203	4273	-5	171	ZK3	Tokelau Island	22	202	3857	-8.4	172.7
T32	E. Kiribati (Line Island)	55	235	4891	-10	150	ZL-ZM	New Zealand	3	183	32	-41	-174.8
T33	Banaba Island (Ocean Island)	17	197	4158	-5	175	ZL7	Chatham Island	115	295	811	-44	176
T5,60	Somalia	260	80	14656	20	-46	ZL8	Kermadec Island	30	210	1412	-30	178
T7	San Marino	288	108	18484	44	-13	ZL9	Auckland & Campbell Island	141	321	1744	-52.5	169
T8	Palau	318	138	6767	9.5	-138.2	ZP	Paraguay	133	313	10868	-25	57.7
TA-TC	Turkey	280	100	16806	39.9	-32.9	ZR-ZU	South Africa	200	20	11304	-33.9	-18.4
TF	Iceland	17	197	17245	64.1	22	ZS8	Prince Edward & Marion Island	208	28	9331	-46.8	-37.8
TG,TD	Guatemala	82	262	11453	14.6	90.5							
TI,TE	Costa Rica	90	270	11665	10	84							
TI9	Cocos Island	92	272	11053	5	87							
TJ	Cameroon	207	27	15515	4	-12							



GREAT CIRCLE BEARINGS FROM WELLINGTON.



QRP operation has a long history in New Zealand, in its many different forms, which include not only home constructing of equipment and lower power DX successes but also for portable use such as in the back country.

**The origins**

QRP is an abbreviation from the old official Q code that was used to speed up communications especially when using different languages and transmitting CW (Morse). These codes go right back to the days of spark transmissions.

QRP? = Shall I decrease transmitter power?

QRP, = with no question mark = Decrease transmitter power!

What watts is QRP?

Today QRP means operating with a transmitter output power of no more than 5 watts. Many hams get excellent results using much less even way down below 1 watt!

Many of the new digital modes such as PSK31 and Whisper, get surprising results using low power, in fact in most cases that's all that is needed.

With today's test equipment it is much easier to measure output power than to perform meaningful and accurate input calculations.

**QRP Gear**

Traditionally QRP gear has been homemade (homebrew), today many use low power commercial rigs. There are also now a large selection of kits available, some

can be purchased as a bare bones kit making them much more economical. But there now seems to be a resurgent's in building gear from scratch, from very simple rigs such as the Tuna tin 2 to multiband transceivers using more sophisticated technologies such as DDS.

**The challenge of QRP**

QRP appears to be one area of amateur radio that is expanding, one only has to look on the internet to see the very large number of sites dedicated to QRP operation through out the world. The large increase in the number of QRP kits available has helped to boost the interest and an interesting situation that has come about it that many of these kits feature in "how to build it" video's on the web site "You Tube". There are even sites for QRP homebrewers that have calculators for working out turns for coils, band-pass filter calculations and many more.

There is a real feeling of satisfaction when one has just completed a DX contact on QRP especially when it has been made on a set you have built yourself. There are a number of contests which include a QRP section such as our own Jock White Memorial Field day, also there are the "Straight key night" and the VK trans Tasman Contest along with the Trans-Tasman CW and digital modes contest with QRP sections. For a straight QRP contest there is the VK QRP hours Contest.



SSB QRP Transceiver

**The ZL scene**

Following a series of adverts in "Break In" for expressions of interest in forming a ZL QRP group which received an excellent response, a group has been formed. The first group newsletter was published at the beginning of July 2010 and appears to have been well received. It is hoped to produce at least four per year. The group has attracted hams from across all fields of QRP with a large number of people very keen on building their own gear. It has been decided to provide a service within the group for obtaining parts from group purchasing, also technical help from the more advanced technical members of the group. Two or three people are looking into the QRP awards and contest situation in New Zealand.

If you are a keen QRP operator or equipment builder and would like to join the group do not hesitate to contact us via the contact details below.

A number of informal QRP nets take place on both 40 and 80 metres. The ZL-QRP group have decided meantime to use 3690kHz as its SSB listening frequency which is an internationally recognised QRP frequency.

Some members of the ZL-QRP group are keen trampers and from time to time can be heard from outdoor locations such as the Tararua Ranges, Nelson lakes, Stewart Island and many others. The availability of small light weight rigs and the ability to make small home brew rigs today have made this a much more interesting concept.

If interested in joining the ZL-QRP group contact -Phil Tarrant ZL2NJ, P.O. Box 55, Wanganui 4540, or Email [philtar@xtra.co.nz](mailto:philtar@xtra.co.nz).

Also contact Phil ZL2NJ to join the G-QRP club or to purchase the G-QRP clubs latest CD which includes all copies of Sprat from issue 1 to issue 140.



DSB QRP Transceiver

**The GQRP Club**

Formed in 1974, the GQRP Club is a non profit organisation run entirely by volunteers to promote Low Power Radio. Whether you have a ham license or not—everyone is welcome. Our quarterly magazine SPRAT provides a fascinating read containing articles of varying complexity, from simple test equipment, to fully functioning radio transmitters and receivers. Membership fees are about as low as you will find anywhere and our club sales service to members is second to none. New Zealand membership Cost \$NZ28.00, contact :- Phil Tarrant ZL2NJ, P.O. Box 55, Wanganui 4540. Email—[Philtar@xtra.co.nz](mailto:Philtar@xtra.co.nz), to join or for further details.



Communication with neighbouring stations by ground waves is not affected by conditions in the upper atmosphere. In contrast all HF communications beyond, at the most, a few tens of kilometres depend on the presence of a layer of gases so strongly ionized as to act as a reflector for skywave signals. These signals projected at the correct angle, will be directed down to the desired destination, either in one hop or by successive hops around the curvature of the earth.

The ionization of the atmospheric gases is renewed each day by ultra-violet radiation from the sun. In the lowest layers (D and E) the density of ions decreases rapidly as the sun goes down, but in the higher F region the ionisation lasts longer and diminishes slowly through the night. The strength of the ionising radiation itself is liable to fluctuate from day to day and week to week. Observatories monitor the state of the ionosphere by sweeping through the HF spectrum with pulses directed vertically upward, timing the echoes to determine the virtual height of the reflecting layer, and noting the critical penetration frequency ( $f_0$ ) above which reflections cease.

Radio waves impinging obliquely on the ionised layer can be reflected on higher frequencies that are related to  $f_0$  by an obliquity factor.

Thus, for example, with an F layer at 300 km, the required radiation angle above the horizon and the maximum usable frequency (MUF) for various distances would be:

0 km  $90^\circ$   $1.0 \times f_0$   
 500 km  $48^\circ$   $1.3 \times f_0$   
 1,000 km  $28^\circ$   $1.9 \times f_0$   
 2,000 km  $14^\circ$   $2.7 \times f_0$   
 3,000 km  $4^\circ$   $3.4 \times f_0$

For instance, when the critical frequency ( $f_0$ ) is 3 MHz the MUF for a 1000 km path is  $1.9 \times 3$  MHz = 5.7 MHz.

This path would be useable on 40 m (MUF = 7 MHz) if the critical frequency increased to  $7 \div 1.9 = 3.7$  MHz.

Signals suffer power loss at every reflection and at every passage through the daytime D and E regions. The lower the frequency the more severe the loss—halving the frequency quadruples the loss. The lowest frequency to give a readable signal at the other end, in spite of losses, depends in part on the effective power radiated at the appropriate angle. Thus the lowest usable frequency (LUF) or absorption-limited frequency (ALF) is not a sharply defined limit applying to all stations like the MUF.

The IARU-NCDXF<sup>[1]</sup> worldwide network of beacons in continuous operation on five amateur bands, and cycling through four power levels, provides a convenient means

of sampling current propagation conditions to other parts of the world (see Figure 1 overleaf). The full 18-beacon sequence on any band can be scanned in only three minutes.

For planning ahead it is usual to make use of predictions of the MUF and LUF based on the historical data provided by ionospheric observatories and averaged for different levels of solar activity.

For a long time the main indicator of solar activity was the sunspot number, but the measurements of microwave radiation from the sun, begun at Ottawa in 1946, have proved more relevant to ionospheric conditions. The solar flux index is the measurement made at local noon (now at Penticton, British Columbia) on 2.8 GHz.<sup>[2]</sup>

This is not the ionising radiation, but is something measurable at the ground that seems to vary in parallel with the ionizing radiations that maintain the ionosphere.

If an estimate can be made of the level of solar activity likely to apply at the time of interest, computers can sort through the world maps of averaged past data and extract the most probable MUFs at the required reflection points, at the relevant time, month and activity level. With considerable simplification, some very convenient programs have been produced for PCs.<sup>[3]</sup> Most try to predict median values of MUF for a path, but to allow for the normal day-to-day variations of ionospheric conditions over a month many also indicate the expected upper decile (UD) value of MUF (likely to be exceeded on about 10 per cent of days) and the lower decile (LD) values (below which the MUF is likely to fall on the worst 10 per cent of days).

Commercial stations normally set their frequencies some distance below the expected median MUFs to minimise the disruptions of schedules on “bad” days, and for this purpose often designate the LD as their optimum working frequency (OWF). This, however, is a compromise frequency—the best propagation is normally to be found just below the actual MUF at the time, which on a “good” day may be 15 per cent or more above the predicted median MUF. Although predictions of median MUFs such as those in *Break-In* may not always fit conditions

on particular days very well, the predictions will still give useful indications of the best and worst times to try to communicate with distant places.

Most HF communications within New Zealand are by single-hop sky wave, requiring a medium to high take-off angle. Most amateur contacts need radiation angles above  $40\text{--}45^\circ$ , few need radiation below  $30^\circ$  to reach the remainder of the country.

At the steep angles needed for nearby communications, signals on the higher frequency bands will penetrate the ionized layers and be lost to space, though lower-angled rays may still be reaching more distant stations. This skip over surrounding areas is most frequent and extensive when the ionisation is weak, notably at night, in the winter winter, and in the years of low activity. Amateurs (including AREC) can usually keep nearby contacts on the 3.5 MHz band, while SAR and CD can change to their lower “night” frequencies. In contrast to local communications, long distance contacts are favoured by the lowest practicable radiation angles in order to maximise the usable frequency, minimise the number of hops needed, and avoid unnecessary absorption losses.

Bursts of X-rays from solar flares can cause immediate intensification of ionisation, notably in the D-region, over sunlit portions of the earth, causing sudden shortwave fadeouts. Clouds of charged particles ejected from the sun, and travelling more slowly, may be by satellite as a satellite proton event (SPE); they can interact with the earth's magnetic field, causing distortions of the field that are indicated by increases in the three-hourly geomagnetic K-index and the 24-hourly A-index, and themselves be deflected towards the magnetic poles to produce enhanced auroral displays, degraded radio propagation across the auroral zone, and perhaps severe polar cap absorption (PCA).<sup>[4]</sup>

### Summary

For long distance contacts use the lowest practicable radiation angle and the highest frequency usable at the time; listen to the beacons for an overview of propagation in different directions (and take great care not to transmit on the beacon frequencies!); listen to the hourly broadcasts from WWV<sup>[5]</sup> or WWVH for the solar flux and K and A indices (and do not expect great propagation across the auroral regions if the

geomagnetic field is disturbed); consult monthly predictions of median MUFs in *Break-In* or on PCs but be prepared for MUFs to be 15 per cent or more above the predicted medians on good days and 15 per cent or more below on bad days.

For domestic communications within New Zealand expect to do best with a medium to high radiation angle and a frequency low enough to avoid skip over the desired paths, but still use the highest band that is usable in order to minimise losses and multipath fading.

### References

- [1] The Northern California DX Foundation website (<[www.ncdx.org](http://www.ncdx.org)>) has pages on beacons, including sites, call-signs, schedules, propagation software and software to monitor the beacons using a sound card.
- [2] The Penticton/Ottawa 2.8 GHz solar flux index observations are now displayed on [4] below. Select “Solar cycle progression” in the “Popular pages” box.
- [3] Propagation prediction software is available through links on most websites in this reference list.
- [4] “Space weather” is the current jargon for solar activity and its influence on the earth. One web site is the Space Weather Prediction Center of the US National Oceanic and Atmospheric Administration (<[www.swpc.noaa.gov](http://www.swpc.noaa.gov)>). The NZART website also has the NOAA solar-terrestrial data, updated every three hours.
- [5] There is a WWV website at [www.tf.nist.gov](http://www.tf.nist.gov).

### Learning about propagation

The RSGB Propagation Studies Committee has a very comprehensive website at <[www.keele.ac.uk/depts/por/psc.htm](http://www.keele.ac.uk/depts/por/psc.htm)> with a listing “relating to radio propagation at all levels from introductory to professional”. There are also numerous links to web sites in this list, and to many others related to propagation. Two ionospheric organisations who are responsible for collecting ionospheric observations also have very good education sections on propagation. They are <[www.swpc.noaa.gov](http://www.swpc.noaa.gov)> (see [4] above) and the Australian Space Weather Agency (<[www.ips.gov.au](http://www.ips.gov.au)>). The latest hourly ionogram from the Eyrewell ionosonde near Christchurch is available at (<[www2.phys.canterbury.ac.nz/~physion/ionogram.html](http://www2.phys.canterbury.ac.nz/~physion/ionogram.html)>).

# ALLOCATION OF INTERNATIONAL CALL-SIGNS

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## Call Sign Allocated to Series

AAA-ALZ	United States of America
AMA-AOZ	Spain
APA-ASZ	Pakistan (Islamic Republic of)
ATA-AWZ	India (Republic of)
AXA-AXZ	Australia
AYA-AZZ	Argentine Republic
A2A-A2Z	Botswana (Republic of)
A3A-A3Z	Tonga (Kingdom of)
A4A-A4Z	Oman (Sultanate of)
A5A-A5Z	Bhutan (Kingdom of)
A6A-A6Z	United Arab Emirates
A7A-A7Z	Qatar (State of)
A8A-A8Z	Liberia (Republic of)
A9A-A9Z	Bahrain (Kingdom of)
BAA-BZZ	China (People's Republic of)
CAA-CEZ	Chile
CFA-CKZ	Canada
CLA-CMZ	Cuba
CNA-CNZ	Morocco (Kingdom of)
COA-COZ	Cuba
CPA-CPZ	Bolivia (Plurinacional State)
CQA-CUZ	Portugal
CVA-CXZ	Uruguay (Eastern Republic of)
CYA-CZZ	Canada
C2A-C2Z	Nauru (Republic of)
C3A-C3Z	Andorra (Principality of)
C4A-C4Z	Cyprus (Republic of)
C5A-C5Z	Gambia (Republic of the)
C6A-C6Z	Bahamas (Commonwealth of)
C7A-C7Z	World Meteorological Organisation
C8A-C9Z	Mozambique (Republic of)
DAA-DRZ	Germany (Federal Republic of)
DSA-DTZ	Korea (Republic of)
DUA-DZZ	Philippines (Republic of the)
D2A-D3Z	Angola (Republic of)
D4A-D4Z	Cape Verde (Republic of)
D5A-D5Z	Liberia (Republic of)
D6A-D6Z	Comoros (Union of the)
D7A-D9Z	Korea (Republic of)
EAA-EHZ	Spain
EIA-EJZ	Ireland
EKA-EKZ	Armenia (Republic of)
ELA-ELZ	Liberia (Republic of)
EMA-EOZ	Ukraine
EPA-EQZ	Iran (Islamic Republic of)
ERA-ERZ	Moldova (Republic of)
ESA-ESZ	Estonia (Republic of)
ETA-ETZ	Ethiopia (Federal Democratic Republic of)
EUA-EWZ	Belarus (Republic of)
EXA-EXZ	Kyrgyz Republic
EYA-EYZ	Tajikistan (Republic of)
EZA-EZZ	Turkmenistan
E2A-E2Z	Thailand
E3A-E3Z	Eritrea
E4A-E4Z	Palestine (In accordance with Res.99 Rev. Guadalajara 2010)
E5A-E5Z	New Zealand - Cook Islands
E7A-E7Z	Bosnia and Herzegovina
FAA-FZZ	France
GAA-GZZ	United Kingdom of Great Britain and Northern Ireland
HAA-HAZ	Hungary (Republic of)
HBA-HBZ	Switzerland (Confederation of)
HCA-HDZ	Ecuador
HEA-HEZ	Switzerland (Confederation of)
HFA-HFZ	Poland (Republic of)
HGA-HGZ	Hungary

## Call Sign Allocated to Series

HHA-HHZ	Haiti (Republic of)
HIA-HIZ	Dominican Republic
HJA-HKZ	Colombia (Republic of)
HLA-HLZ	Korea (Republic of)
HMA-HMZ	Democratic People's Republic of Korea
HNA-HNZ	Iraq (Republic of)
HOA-HPZ	Panama (Republic of)
HQA-HRZ	Honduras (Republic of)
HSA-HSZ	Thailand
HTA-HTZ	Nicaragua
HUA-HUZ	El Salvador (Republic of)
HVA-HVZ	Vatican City State
HWA-HYZ	France
HZA-HZZ	Saudi Arabia (Kingdom of)
H2A-H2Z	Cyprus (Republic of)
H3A-H3Z	Panama (Republic of)
H4A-H4Z	Solomon Islands
H6A-H7Z	Nicaragua
H8A-H9Z	Panama (Republic of)
IAA-IZZ	Italy
JAA-JSZ	Japan
JTA-JVZ	Mongolia
JWA-JXZ	Norway
JYA-JYZ	Jordan (Hashemite Kingdom of)
JZA-JZZ	Indonesia (Republic of)
J2A-J2Z	Djibouti (Republic of)
J3A-J3Z	Grenada
J4A-J4Z	Greece
J5A-J5Z	Guinea-Bissau (Republic of)
J6A-J6Z	Saint Lucia
J7A-J7Z	Dominica (Commonwealth of)
J8A-J8Z	Saint Vincent and the Grenadines
KAA-KZZ	United States of America
LAA-LNZ	Norway
LOA-LWZ	Argentine Republic
LXA-LXZ	Luxembourg
LYA-LYZ	Lithuania (Republic of)
LZA-LZZ	Bulgaria (Republic of)
L2A-L9Z	Argentine Republic
MAA-MZZ	United Kingdom of Great Britain and Northern Ireland
NAA-NZZ	United States of America
OAA-OCZ	Peru
ODA-ODZ	Lebanon
OEA-OEZ	Austria
OFA-OJZ	Finland
OKA-OLZ	Czech Republic
OMA-OMZ	Slovak Republic
ONA-OTZ	Belgium
OUA-OZZ	Denmark
PAA-PIZ	Netherlands (Kingdom of the)
PJA-PJZ	Netherlands (Kingdom of the) - Sint Martin (Dutch Part)
	Netherlands (Kingdom of the) - Bonaire, Sint Eustasius and Saba
	Netherlands (Kingdom of the) - Curaçao
PKA-POZ	Indonesia (Republic of)
PPA-PYZ	Brazil (Federative Republic of)
PZA-PZZ	Suriname (Republic of)
P2A-P2Z	Papua New Guinea
P3A-P3Z	Cyprus (Republic of)
P4A-P4Z	Netherlands (Kingdom of the) - Aruba
P5A-P9Z	Democratic People's Republic of Korea
RAA-RZZ	Russian Federation
SAA-SMZ	Sweden
SNA-SRZ	Poland (Republic of)

## Call Sign Allocated to Series

SSA-SSM	Egypt (Arab Republic of)
SSN-STZ	Sudan (Republic of the)
SUA-SUZ	Egypt (Arab Republic of)
SVA-SZZ	Greece
S2A-S3Z	Bangladesh (People's Republic of)
S5A-S5Z	Slovenia (Republic of)
S6A-S6Z	Singapore (Republic of)
S7A-S7Z	Seychelles (Republic of)
S8A-S8Z	South Africa (Republic of)
S9A-S9Z	Sao Tome and Principe (Democratic Republic of)
TAA-TCZ	Turkey
TDA-TDZ	Guatemala (Republic of)
TEA-TEZ	Costa Rica
TFA-TFZ	Iceland
TGA-TGZ	Guatemala (Republic of)
THA-THZ	France
TIA-TIZ	Costa Rica
TJA-TJZ	Cameroon (Republic of)
TKA-TKZ	France
TLA-TLZ	Central African Republic
TMA-TMZ	France
TNA-TNZ	Congo (Republic of the)
TOA-TQZ	France
TRA-TRZ	Gabonese Republic
TSA-TSZ	Tunisia
TTA-TTZ	Chad (Republic of)
TUA-TUZ	Côte d'Ivoire (Republic of)
TVA-TXZ	France
TYA-TYZ	Benin (Republic of)
TZA-TZZ	Mali (Republic of)
T2A-T2Z	Tuvalu
T3A-T3Z	Kiribati (Republic of)
T4A-T4Z	Cuba
T5A-T5Z	Somali Democratic Republic
T6A-T6Z	Afghanistan
T7A-T7Z	San Marino (Republic of)
T8A-T8Z	Palau (Republic of)
UAA-UIZ	Russian Federation
UJA-UMZ	Uzbekistan (Republic of)
UNA-UQZ	Kazakhstan (Republic of)
URA-UZZ	Ukraine
VAA-VGZ	Canada
VHA-VNZ	Australia
VOA-VOZ	Canada
VPA-VQZ	United Kingdom of Great Britain and Northern Ireland
VRA-VRZ	China (People's Republic of) - Hong Kong
VSA-VSZ	United Kingdom of Great Britain and Northern Ireland
VTA-VWZ	India (Republic of)
VXA-VYZ	Canada
VZA-VZZ	Australia
V2A-V2Z	Antigua and Barbuda
V3A-V3Z	Belize
V4A-V4Z	Saint Kitts and Nevis (Federation of)
V5A-V5Z	Namibia (Republic of)
V6A-V6Z	Micronesia (Federated States of)
V7A-V7Z	Marshall Islands (Republic of the)
V8A-V8Z	Brunei Darussalam
WAA-WZZ	United States of America
XAA-XIZ	Mexico
XJA-XOZ	Canada
XPA-XPZ	Denmark
XQA-XRZ	Chile
XSA-XSZ	China (People's Republic of)
XTA-XTZ	Burkina Faso
XUA-XUZ	Cambodia (Kingdom of)
XVA-XVZ	Viet Nam (Socialist Republic of)



### Call Sign Allocated to Series

XWA-XWZ	Lao People's Democratic Republic
XXA-XXZ	China (People's Republic of) - Macao
XYA-XZZ	Myanmar (Union of)
YAA-YAZ	Afghanistan
YBA-YHZ	Indonesia (Republic of)
YIA-YIZ	Iraq (Republic of)
YJA-YJZ	Vanuatu (Republic of)
YKA-YKZ	Syrian Arab Republic
YLA-YLZ	Latvia (Republic of)
YMA-YMZ	Turkey
YNA-YNZ	Nicaragua
YOA-YZZ	Romania
YSA-YSZ	El Salvador (Republic of)
YTA-YUZ	Serbia (Republic of)
YVA-YYZ	Venezuela (Bolivarian Republic of)
Y2A-Y9Z	Germany (Federal Republic of)
ZAA-ZAZ	Albania (Republic of)
ZBA-ZJZ	United Kingdom of Great Britain and Northern Ireland
ZKA-ZMZ	New Zealand
ZNA-ZOZ	United Kingdom of Great Britain and Northern Ireland
ZPA-ZPZ	Paraguay (Republic of)
ZQA-ZQZ	United Kingdom of Great Britain and Northern Ireland
ZRA-ZUZ	South Africa (Republic of)
ZVA-ZZZ	Brazil (Federative Republic of)
Z2A-Z2Z	Zimbabwe (Republic of)
Z3A-Z3Z	The Former Yugoslav Republic of Macedonia
2AA-2ZZ	United Kingdom of Great Britain and Northern Ireland
3AA-3AZ	Monaco (Principality of)
3BA-3BZ	Mauritius (Republic of)
3CA-3CZ	Equatorial Guinea (Republic of)
3DA-3DM	Swaziland (Kingdom of)
3DN-3DZ	Fiji (Republic of)
3EA-3FZ	Panama (Republic of)
3GA-3GZ	Chile
3HA-3UZ	China (People's Republic of)
3VA-3VZ	Tunisia

### Call Sign Allocated to Series

3WA-3WZ	Viet Nam (Socialist Republic of)
3XA-3XZ	Guinea (Republic of)
3YA-3YZ	Norway
3ZA-3ZZ	Poland (Republic of)
4AA-4CZ	Mexico
4DA-4IZ	Philippines (Republic of the)
4JA-4KZ	Azerbaijani Republic
4LA-4LZ	Georgia
4MA-4MZ	Venezuela (Bolivarian Republic of)
4OA-4OZ	Montenegro
4PA-4SZ	Sri Lanka (Democratic Socialist Republic of)
4TA-4TZ	Peru
* 4UA-4UZ	United Nations
4VA-4VZ	Haiti (Republic of)
4WA-4WZ	Timor-Leste (Democratic Republic of)
4XA-4XZ	Israel (State of)
* 4YA-4YZ	International Civil Aviation Organization
4ZA-4ZZ	Israel (State of)
5AA-5AZ	Libya
5BA-5BZ	Cyprus (Republic of)
5CA-5GZ	Morocco (Kingdom of)
5HA-5IZ	Tanzania (United Republic of)
5JA-5KZ	Colombia (Republic of)
5LA-5MZ	Liberia (Republic of)
5NA-5OZ	Nigeria (Federal Republic of)
5PA-5QZ	Denmark
5RA-5SZ	Madagascar (Republic of)
5TA-5TZ	Mauritania (Islamic Republic of)
5UA-5UZ	Niger (Republic of the)
5VA-5VZ	Togolese Republic
5WA-5WZ	Samoa (Independent State of)
5XA-5XZ	Mauritania (Republic of)
5YA-5ZZ	Kenya (Republic of)
6AA-6BZ	Egypt (Arab Republic of)
6CA-6CZ	Syrian Arab Republic
6DA-6JZ	Mexico
6KA-6NZ	Korea (Republic of)
6OA-6OZ	Somali Democratic Republic
6PA-6SZ	Pakistan (Islamic Republic of)
6TA-6UZ	Sudan (Republic of the)

### Call Sign Allocated to Series

6VA-6WZ	Senegal (Republic of)
6XA-6XZ	Madagascar (Republic of)
6YA-6YZ	Jamaica
6ZA-6ZZ	Liberia (Republic of)
7AA-7IZ	Indonesia (Republic of)
7JA-7NZ	Japan
7OA-7OZ	Yemen (Republic of)
7PA-7PZ	Lesotho (Kingdom of)
7QA-7QZ	Malawi
7RA-7RZ	Algeria (People's Democratic Republic of)
7SA-7SZ	Sweden
7TA-7YZ	Algeria (People's Democratic Republic of)
7ZA-7ZZ	Saudi Arabia (Kingdom of)
8AA-8IZ	Indonesia (Republic of)
8JA-8NZ	Japan
8OA-8OZ	Botswana (Republic of)
8PA-8PZ	Barbados
8QA-8QZ	Maldives (Republic of)
8RA-8RZ	Guyana
8SA-8SZ	Sweden
8TA-8YZ	India (Republic of)
8ZA-8ZZ	Saudi Arabia (Kingdom of)
9AA-9AZ	Croatia (Republic of)
9BA-9DZ	Iran (Islamic Republic of)
9EA-9FZ	Ethiopia (Federal Democratic Republic of)
9GA-9GZ	Ghana
9HA-9HZ	Malta
9IA-9JZ	Zambia (Republic of)
9KA-9KZ	Kuwait (State of)
9LA-9LZ	Sierra Leone
9MA-9MZ	Malaysia
9NA-9NZ	Nepal
9OA-9TZ	Democratic Republic of the Congo
9UA-9UZ	Burundi (Republic of)
9VA-9VZ	Singapore (Republic of)
9WA-9WZ	Malaysia
9XA-9XZ	Rwanda (Republic of)
9YA-9ZZ	Trinidad and Tobago

## THE PHONETIC ALPHABET

The Phonetic Alphabet should be used with considerable discretion. Its primary purpose is to obviate confusion between letters and figures which have similar sounds, e.g.: BCDEGPVT, AKJ, MN, QU, FS, TWO, THREE, FIVE, NINE.

The possibility of confusion increases greatly under adverse operating conditions such as adjacent channel interference, high level of acoustic and electrical background noise, poor audio quality (including inferior articulation), fading, etc. Under

these conditions more frequent use of the phonetic code may be necessary. However, when there is a complete absence of interference of any kind and signals are perfectly readable, phonetics can be eliminated except for difficult place names, prop-

er names, and unusual words. Regardless of the quality of the circuit phonetics should always be used for call-signs during the establishment of initial contact. It is important to memorize the code thoroughly and to avoid using substitute words.

### Phonetic Alphabet

Some words are likely to be misunderstood when passed over radio telephone circuits, due to phonetic similarity. A number of phonetic alphabets have been introduced to overcome this. The following being the most generally accepted at the present time.

A	ALFA	AL fah	P	PAPA	pah PAH
B	BRAVO	BRAH voh	Q	QUEBEC	Kwee BECK or Key BECK
C	CHARLIE	CHAR lee	R	ROMEO	ROW me oh
D	DELTA	DELL tah	S	SIERRA	See AIR rah
E	ECHO	ECK oh	T	TANGO	TANG go
F	FOXTROT	FOKS trot	U	UNIFORM	YOU nee form or OO nee form
G	GOLF	GOLF	V	VICTOR	VIK tor
H	HOTEL	hoh TELL	W	WHISKEY	WISS key
I	INDIA	IN dee ah	X	X-RAY	ECKS ray
J	JULIET	JEW lee ETT	Y	YANKEE	YANG kee
K	KILO	KEY loh	Z	ZULU	ZOO loo
L	LIMA	LEE mah			
M	MIKE	MIKE			
N	NOVEMBER	no VEM ber	1 WUN	2 TOO	3 thuh-REE
O	OSCAR	OSS cah	6 SIX	7 seVEN	8 AIT
					4 FO-wer
					5 FI-yiv
					9 NI-ner
					0 ZERO

# DX CENTURY CLUB COUNTRIES LIST

Reproduced Courtesy ARRL April 2012

Notes	Prefix	Entity	Cont	ITU	CQ	Entity Code	Notes	Prefix	Entity	Cont	ITU	CQ	Entity Code
		Spratly Is.	AS	50	26	247	F	A2	Botswana	AF	57	38	402
1	1A	Sov. Mil. Order of Malta	EU	28	15	246		A3	Tonga	OC	62	32	160
F	3A	Monaco	EU	27	14	260	F	A4	Oman	AS	39	21	370
	3B6,7	Agalega & St. Brandon Is.	AF	53	39	4		A5	Bhutan	AS	41	22	306
	3B8	Mauritius	AF	53	39	165		A6	United Arab Emirates	AS	39	21	391
	3B9	Rodriguez I.	AF	53	39	207	F	A7	Qatar	AS	39	21	376
	3C	Equatorial Guinea	AF	47	36	49	F	A9	Bahrain	AS	39	21	304
	3C0	Annobon I.	AF	52	36	195	F	AP	Pakistan	AS	41	21	372
F	3D2	Fiji	OC	56	32	176	F	B	China	AS	(A)	23,24	318
	3D2	Conway Reef	OC	56	32	489	11	BS7	Scarborough Reef	AS	50	27	506
F	3D2	Rotuma I.	OC	56	32	460	F	BU-BX	Taiwan	AS	44	24	386
T	3DA	Swaziland	AF	57	38	468	12	BV9P	Pratas I.	AS	44	24	505
F	3V	Tunisia	AF	37	33	474		C2	Nauru	OC	65	31	157
	3W,XV	VietNam	AS	49	26	293	F	C3	Andorra	EU	27	14	203
	3X	Guinea	AF	46	35	107	T	C5	The Gambia	AF	46	35	422
F	3Y	Bouvet	AF	67	38	24		C6	Bahamas	NA	11	8	60
F	3Y	Peter I.	AN	72	12	199	F	C8-9	Mozambique	AF	53	37	181
	4J,4K	Azerbaijan	AS	29	21	18	F,T	CA-CE	Chile	SA	14,16	12	112
F	4L	Georgia	AS	29	21	75	F,T	CE0	Easter I.	SA	63	12	47
F,47	4O	Montenegro	EU	28	15	514	F,T	CE0	Juan Fernandez Is.	SA	14	12	125
F	4S	Sri Lanka	AS	41	22	315	F,T	CE0	San Felix & San Ambrosio	SA	14	12	217
F,T	4U,ITU	ITU HQ	EU	28	14	117	F,S	CE9/KC4	Antarctica	AN	(B)	(C)	13
F	4U_UN	United Nations HQ	NA	8	5	289	F,T	CN,CO	Cuba	NA	11	8	70
44	4W	Timor-Leste	OC	54	28	511		CM	Morocco	AF	37	33	446
	4X,4Z	Israel	AS	39	20	336	F,T	CP	Bolivia	SA	12,14	10	104
	5A	Libya	AF	38	34	436	F	CT	Portugal	EU	37	14	272
F	5B,C4,P3	Cyprus	AS	39	20	215	F	CT3	Madeira Is.	AF	36	33	256
F	5H-5I	Tanzania	AF	53	37	470	F	CU	Azores	EU	36	14	149
F	5N	Nigeria	AF	46	35	450	F,T	CV-CX	Uruguay	SA	14	13	144
	5R	Madagascar	AF	53	39	438	F	CY0	Sable I.	NA	9	5	211
2	5T	Mauritania	AF	46	35	444	F	CY9	St. Paul I.	NA	9	5	252
3	5U	Niger	AF	46	35	187		D2-3	Angola	AF	52	36	401
	5V	Togo	AF	46	35	483		D4	Cape Verde	AF	46	35	409
F	5W	Samoa	OC	62	32	190	F,T,13D6		Comoros	AF	53	39	411
F	5X	Uganda	AF	48	37	286	F,14	DA-DR	Fed. Rep. of Germany	EU	28	14	230
F	5Y-5Z	Kenya	AF	48	37	430	F,T	DU-DZ,4D-4I	Philippines	OC	50	27	375
F,4	6V-6W	Senegal	AF	46	35	456	15	E3	Eritrea	AF	48	37	51
F,T	6Y	Jamaica	NA	11	8	82	43	E4	Palestine	AS	39	20	510
5	7O	Yemen	AS	39	21	492		E5	N. Cook Is.	OC	62	32	191
	7P	Lesotho	AF	57	38	432		E5	S. Cook Is.	OC	62	32	234
	7Q	Malawi	AF	53	37	440	F	E6	Niue	OC	62	32	188
F	7T-7Y	Algeria	AF	37	33	400	F,T,29E7		Bosnia-Herzegovina	EU	28	15	501
F	8P	Barbados	NA	11	8	62	F	EA-EH	Spain	EU	37	14	281
F	8Q	Maldives	AS/AF	41	22	159	F	EA6-EH6	Balearic Is.	EU	37	14	21
F,T	8R	Guyana	SA	12	9	129	F	EA8-EH8	Canary Is.	AF	36	33	29
F,6	9A	Croatia	EU	28	15	497	F	EA9-EH9	Ceuta & Melilla	AF	37	33	32
F,T,7	9G	Ghana	AF	46	35	424	F	EI-EJ	Ireland	EU	27	14	245
F	9H	Malta	EU	28	15	257	F	EK	Armenia	AS	29	21	14
F	9I-9J	Zambia	AF	53	36	482	F,T	EL	Liberia	AF	46	35	434
F	9K	Kuwait	AS	39	21	348	F	EP-EQ	Iran	AS	40	21	330
T	9L	Sierra Leone	AF	46	35	458	F	ER	Moldova	EU	29	16	179
F,8	9M2,4	West Malaysia	AS	54	28	299	F	ES	Estonia	EU	29	15	52
F,8	9M6,8	East Malaysia	OC	54	28	46	F	ET	Ethiopia	AF	48	37	53
	9N	Nepal	AS	42	22	369	F	EU-EW	Belarus	EU	29	16	27
F	9Q-9T	Dem. Rep. of Congo	AF	52	36	414	F	EX	Kyrgyzstan	AS	30,31	17	135
9	9U	Burundi	AF	52	36	404	F	EY	Tajikistan	AS	30	17	262
F,10	9V	Singapore	AS	54		381	F	EZ	Turkmenistan	AS	30	17	280
9	9X	Rwanda	AF	52	36	454	F	F	France	EU	27	14	227
F,T	9Y-9Z	Trinidad & Tobago	SA	11	9	90	F	FG,TO	Guadeloupe	NA	11	8	79



Notes	Prefix	Entity	Cont	ITU	CQ	Entity Code	Notes	Prefix	Entity	Cont	ITU	CQ	Entity Code
F,13	FH,	TOMayotte	AF	53	39	169	T	KH1	Baker & Howland Is.	OC	61	31	20
F,49	FJ,	TO Saint Barthelemy	NA	11	8	516	F,T	KH2	Guam	OC	64	27	103
F	FK,	TXNew Caledonia	OC	56	32	162	F,T	KH3	Johnston I.	OC	61	31	123
45	FK,	TXChesterfield Is.	OC	56	30	512	T	KH4	Midway I.	OC	61	31	174
F	FM,	TOMartinique	NA	11	8	84	T	KH5	Palmyra & Jarvis Is.	OC	61,62	31	197
F,16	FO,	TXAustral I.	OC	63	32	508	T	KH5K	Kingman Reef	OC	61	31	134
F	FO,	TXClipperton I.	NA	10	7	36	F,T	KH6,7	Hawaii	OC	61	31	110
F	FO,	TXFrench Polynesia	OC	63	32	175	T	KH7K	Kure I.	OC	61	31	138
F,16	FO,	TXMarquesas Is.	OC	63	31	509	F,T	KH8	American Samoa	OC	62	32	9
F	FP	St. Pierre & Miquelon	NA	9	5	277	F,T,48	KH8	Swains I.	OC	62	32	515
F	FR,	TOReunion I.	AF	53	39	453	T	KH9	Wake I.	OC	65	31	297
F,17	FT/G,	TO Glorioso Is.	AF	53	39	99	F,T	KL,AL,NL,WL	Alaska	NA	1,2	1	6
F,17	FT/J,E,	TO Juan de Nova, Europa	AF	53	39	124	T	KP1	Navassa I.	NA	11	8	182
F	FT/T,	TO Tromelin I.	AF	53	39	276	F,T	KP2	Virgin Is.	NA	11	8	285
F	FS,	TO Saint Martin	NA	11	8	213	F,T	KP3,4	Puerto Rico	NA	11	8	202
F	FT/W	Crozet I.	AF	68	39	41	T,22	KP5	Desecheo I.	NA	11	8	43
F	FT/X	Kerguelen Is.	AF	68	39	131	F	LA-LN	Norway	EU	18	14	266
F	FT/Z	Amsterdam & St. Paul Is.	AF	68	39	10	F,T	LO-LW	Argentina	SA	14,16	13	100
F	FW	Wallis & Futuna Is.	OC	62	32	298	F	LX	Luxembourg	EU	27	14	254
F	FY	French Guiana	SA	12	9	63	F	LY	Lithuania	EU	29	15	146
F	G,GX,M	England	EU	27	14	223	F	LZ	Bulgaria	EU	28	20	212
F	GD,GT	Isle of Man	EU	27	14	114	F,T	OA-OC	Peru	SA	12	10	136
F	GI,GN	Northern Ireland	EU	27	14	265	F	OD	Lebanon	AS	39	20	354
F	GJ,GH	Jersey	EU	27	14	122	F	OE	Austria	EU	28	15	206
F	GM,GS	Scotland	EU	27	14	279	F	OF-OI	Finland	EU	18	15	224
F	GU,GPG	Guernsey	EU	27	14	106	F	OH0	AlandIs.	EU	18	15	5
F	GW,GC	Wales	EU	27	14	294	F	OJ0	Market Reef	EU	18	15	167
F	H4	Solomon Is.	OC	51	28	185	F,23	OK-OLC	Czech Republic	EU	28	15	503
F,18	H40	Temotu Province	OC	51	32	507	F,23	OM	Slovak Republic	EU	28	15	504
F	HA,HG	Hungary	EU	28	15	239	F	ON-OT	Belgium	EU	27	14	209
F	HB	Switzerland	EU	28	14	287	F	OU-OW,OZ	Denmark	EU	18	14	221
	HB0	Liechtenstein	EU	28	14	251	F	OX	Greenland	NA	5,75	40	237
F,T	HC-HD	Ecuador	SA	12	10	120	F	OY	Faroe Is.	EU	18	14	222
F,T	HC8-HD8	Galapagos Is.	SA	12	10	71	24	P2	Papua New Guinea	OC	51	28	163
T	HH	Haiti	NA	11	8	78	F,25	P4	Aruba	SA	11	9	91
F,T	HI	Dominican Republic	NA	11	8	72	26	P5	DPR of Korea	AS	44	25	344
F,T	HJ-HK,5J-5K	Colombia	SA	12	9	116	F	PA-PI	Netherlands	EU	27	14	263
F,T	HK0	Malpelo I.	SA	12	9	161	50	PJ2	Curacao	SA	11	9	517
F,T	HK0	San Andres & Providencia	NA	11	7	216	51	PJ4	Bonaire	SA	11	9	520
F	HL,6K-6N	Republic of Korea	AS	44	25	137	52	PJ5,6	Saba & St. Eustatius	NA	11	8	519
F,T	HO-HP	Panama	NA	11	7	88	53	PJ7	St Maarten	NA	11	8	518
F,T	HQ-HR	Honduras	NA	11	7	80	F,T	PP-PY,ZV-ZZ	Brazil	SA	(D)	11	108
F	HS,E2	Thailand	AS	49	26	387	F,T	PP0-PY0F	Fernando de Noronha	SA	13	11	56
	HV	Vatican	EU	28	15	295	F,T	PP0-PY0S	St. Peter & St. Paul Rocks	SA	13	11	253
F	HZ	Saudi Arabia	AS	39	21	378	F,T	PP0-PY0T	Trindade & Martim Vaz Is.	SA	15	11	273
F	I	Italy	EU	28	15,33	248		PZ	Suriname	SA	12	9	140
F	IS0,IM0	Sardinia	EU	28	15	225	F	R1/F	Franz Josef Land	EU	75	40	61
F	J2	Djibouti	AF	48	37	382	1,27	S0	Western Sahara	AF	46	33	302
F,T	J3	Grenada	NA	11	8	77	F	S2	Bangladesh	AS	41	22	305
	J5	Guinea-Bissau	AF	46	35	109	F,6	S5	Slovenia	EU	28	15	499
F,T	J6	St. Lucia	NA	11	8	97		S7	Seychelles	AF	53	39	379
F,T	J7	Dominica	NA	11	8	95		S9	Sao Tome & Principe	AF	47	36	219
T	J8	St. Vincent	NA	11	8	98	F	SA-SM,7S-8S	Sweden	EU	18	14	284
F	JA-JS,7J-7N	Japan	AS	45	25	339	F	SN-SR	Poland	EU	28	15	269
F,19	JD1	Minami Torishima	OC	90	27	177		ST	Sudan	AF	47,48	34	466
F,20	JD1	Ogasawara	AS	45	27	192		SU	Egypt	AF	38	34	478
F	JT-JV	Mongolia	AS	32,33	23	363	F	SV-SZ,J4	Greece	EU	28	20	236
F	JW	Svalbard	EU	18	40	259	F	SV/A	Mount Athos	EU	28	20	180
F	JX	Jan Mayen	EU	18	40	118	F	SV5,J45	Dodecanese	EU	28	20	45
F,T	JY	Jordan	AS	39	20	342	F	SV9,J49	Crete	EU	28	20	40
T	K,W,N,AA-AK	United States of America	NA	6,7,8	3,4,5	291	28	T2	Tuvalu	OC	65	31	282
T	KG4	Guantanamo Bay	NA	11	8	105		T30	W. Kiribati (Gilbert Is.)	OC	65	31	301
T	KH0	Mariana Is.	OC	64	27	166							

Notes	Prefix	Entity	Cont	ITU	CQ	Entity Code	Notes	Prefix	Entity	Cont	ITU	CQ	Entity Code
	T31	C. Kiribati (British Phoenix Is)	OC	62	31	31	F	VP8	Falkland Is.	SA	16	13	141
	T32	E. Kiribati (Line Is.)	OC	61,63	31	48	F	VP8,LU	South Georgia I.	SA	73	13	235
	T33	Banaba I. (Ocean I.)	OC	65	31	490	F	VP8,LU	South Orkney Is.	SA	73	13	238
	T5,60	Somalia	AF	48	37	232	F	VP8,LU,CE9,HF0,4K1	South Sandwich Is.	SA	73	13	240
F	T7	San Marino	EU	28	15	278			South Shetland Is.	SA	73	13	241
21	T8	Palau	OC	64	27	22	F	VP9	Bermuda	NA	11	5	64
F	TA-TC	Turkey	EU/AS	39	20	390	F	VQ9	Chagos Is.	AF	41	39	33
F	TF	Iceland	EU	17	40	242	F	VR	Hong Kong	AS	44	24	321
FT	TG,TD	Guatemala	NA	12	7	76	F	VU	India	AS	41	22	324
FT	TI,TE	Costa Rica	NA	11	7	308	F	VU4	Andaman & Nicobar Is.	AS	49	26	11
FT	TI9	Cocos I.	NA	12	7	37	F	VU7	Lakshadweep Is.	AS	41	22	142
	TJ	Cameroon	AF	47	36	406	FT	XA-XI	Mexico	NA	10	6	50
F	TK	Corsica	EU	28	15	214	FT	XA4-XI4	Revillagigedo	NA	10	6	204
30	TL	Central Africa	AF	47	36	408	F,39	XT	Burkina Faso	AF	46	35	480
31	TN	Congo (Republic of the)	AF	52	36	412		XU	Cambodia	AS	49	26	312
F,32	TR	Gabon	AF	52	36	420		XW	Laos	AS	49	26	143
33	TT	Chad	AF	47	36	410	F	XX9	Macao	AS	44	24	152
34	TU	Cote d' Ivoire	AF	46	35	428		XY-XZ	Myanmar	AS	49	26	309
35	TY	Benin	AF	46	35	416		YA,T6	Afghanistan	AS	40	21	3
F,36	TZ	Mali	AF	46	35	442	F,40	YB-YH	Indonesia	OC	51,54	28	327
F	UA-UI1,3,4,6RA-RZ	European Russia	EU	(E)	16	54	F	YI	Iraq	AS	39	21	333
F	UA2,RA2	Kaliningrad	EU	29	15	126	F	YJ	Vanuatu	OC	56	32	158
F	UA-UI8,9,0RA-RZ	Asiatic Russia	AS	(F)	(G)	15	F	YK	Syria	AS	39	20	384
	UJ-UM	Uzbekistan	AS	30	17	292	F	YL	Latvia	EU	29	15	145
F	UN-UQ	Kazakhstan	AS	29-31	17	130	FT	YN,H6-7,HT	Nicaragua	NA	11	7	86
F	UR-UZ,EM-EO	Ukraine	EU	29	16	288	F	YO-YR	Romania	EU	28	20	275
FT	V2	Antigua & Barbuda	NA	11	8	94	FT	YS,HUEI	Salvador	NA	11	7	74
T	V3	Belize	NA	11	7	66	F	YT-YU	Serbia	EU	28	15	296
T,37	V4	St. Kitts & Nevis	NA	11	8	249	FT	YV-YY,4M	Venezuela	SA	12	9	148
F	V5	Namibia	AF	57	38	464	FT	YV0	Aves I.	NA	11	8	17
38	V6	Micronesia	OC	65	27	173		Z2	Zimbabwe	AF	53	38	452
FT	V7	Marshall Is.	OC	65	31	168	F,41	Z3	Macedonia	EU	28	15	502
F	V8	Brunei Darussalam	OC	54	28	345	54	Z8	South Sudan (Rep of)	AF	48	34	521
FT	VA-VG,VO,VY	Canada	NA	(H)	1-May	1		ZA	Albania	EU	28	15	7
FT	VK,AXA	Australia	OC	(I)	29,30	150	F	ZB2	Gibraltar	EU	37	14	233
FT	VK0	Heard I.	AF	68	39	111	F,42	ZC4	UK Sov. Base Areas on Cyprus	AS	39	20	283
FT	VK0	Macquarie I.	OC	60	30	153	F	ZD7	St. Helena	AF	66	36	250
FT	VK9C	Cocos (Keeling) Is.	OC	54	29	38	F	ZD8	Ascension I.	AF	66	36	205
FT	VK9L	Lord Howe I.	OC	60	30	147		ZD9	Tristan da Cunha & Gough I.	AF	66	38	274
FT	VK9M	Mellish Reef	OC	56	30	171	F	ZF	Cayman Is.	NA	11	8	69
F	VK9N	Norfolk I.	OC	60	32	189	F	ZK3	Tokelau Is.	OC	62	31	270
FT	VK9W	Willis I.	OC	55	30	303	F	ZL-ZM	New Zealand	OC	60	32	170
FT	VK9X	Christmas I.	OC	54	29	35	F	ZL7	Chatham Is.	OC	60	32	34
37	VP2E	Anguilla	NA	11	8	12	F	ZL8	Kermadec Is.	OC	60	32	133
37	VP2M	Montserrat	NA	11	8	96	F	ZL9	Auckland & Campbell Is.	OC	60	32	16
F,37	VP2V	British Virgin Is.	NA	11	8	65	FT	ZP	Paraguay	SA	14	11	132
F	VP5	Turks & Caicos Is.	NA	11	8	89	FT	ZR-ZU	South Africa	AF	57	38	462
FT	VP6	Pitcairn I.	OC	63	32	172	F	ZS8	Prince Edward & Marion Is.	AF	57	38	201
F,46	VP6	Ducie I.	OC	63	32	513							

NOTES:

- 1 Unofficial prefix.
- 2 (5T) Only contacts made June 20, 1960, and after, count for this entity.
- 3 (5U) Only contacts made August 3, 1960, and after, count for this entity.
- 4 (6W) Only contact made June 20, 1960, and after, count for this entity.
- 5 (70) Only contacts made May 22, 1990, and after, count for this entity.
- 6 (9A,S5) Only contacts made June 26, 1991, and after, count for this entity.
- 7 (9G) Only contacts made March 5, 1957, and after, count for this entity.
- 8 (9M2,4,6,8) Only contacts made September 16, 1963, and after, count for this entity.

- 9 (9U, 9X) Only contacts made July 1, 1962, and after, count for this entity.
- 10 (9V) Contacts made from September 16, 1963 to August 8, 1965, count for West Malaysia.
- 11 (BS7) Only contacts made January 1, 1995, and after, count for this entity.
- 12 (BV9P) Only contact made January 1, 1994, and after, count for this entity.
- 13 (D6,FH) Only contacts made July 6, 1975, and after, count for this entity.
- 14 (DA-DR) Only contacts made with DA-DL stations September 17, 1973, and after, and contacts made Y2-Y9 stations October 3, 1990 and after, count for this entity.
- 15 (E3) Only contacts made November 14, 1962, and before, or May 24, 1991,



- and after, count for this entity.
- 16 (F0) Only contacts made after 23:59 UTC, March 31, 1998 count for this entity.
- 17 (FR) Only contacts made June 25, 1960, and after, count for this entity.
- 18 (H40) Only contacts made after 23:59 UTC, March 31, 1998 count for this entity.
- 19 (JD) Formerly Marcus Island.
- 20 (JD) Formerly Bonin and Volcano Islands .
- 21 (T8) Valid prefix January 1, 1994, or after (KC6 prior to this date).
- 22 (KP5) Only contacts made March 1, 1979, and after, count for this entity.
- 23 (OK-OL, OM) Only contacts made January 1, 1993, and after, count for this entity.
- 24 (P2) Only contacts made September 16, 1975, and after count for this entity.
- 25 (P4) Only contacts made January 1, 1986, and after, count for this entity.
- 26 (P5) Only contacts made May 14, 1995, and after, count for this entity.
- 27 (S0) Contacts with Rio de Oro (Spanish Sahara), EA9, also count for this entity.
- 28 (T2) Only contacts made January 1, 1976, and after, count for this entity.
- 29 (E7) New prefix for Bosnia - Herzegovina effective November 17, 2007.  
Contacts are valid for this entity effective October 15, 1991.
- 30 (TL) Only contacts made August 13, 1960, and after, count for this entity.
- 31 (TN) Only contacts made August 15, 1960, and after, count for this entity.
- 32 (TR) Only contacts made August 17, 1960, and after, count for this entity.
- 33 (TT) Only contacts made August 11, 1960, and after, count for this entity.
- 34 (TU) Only contacts made August 7, 1960, and after, count for this entity.
- 35 (TY) Only contacts made August 1, 1960, and after, count for this entity.
- 36 (TZ) Only contacts made June 20, 1960, and after, count for this entity.
- 37 (V4,VP2) For DXCC credit for contacts made May 31, 1958, and before, see page 97, June 1958 QST.
- 38 (V6) Includes Yap Islands January 1, 1981, and after.

- 39 (XT) Only contacts made August 16, 1960, and after, count for this entity.
- 40 (YB) Only contacts made May 1, 1963, and after, count for this entity.
- 41 (Z3) Only contacts made September 8, 1991, and after, count for this entity.
- 42 (ZC4) Only contacts made August 16, 1960, and after, count for this entity.
- 43 (E4) Only contacts made February 1, 1999, and after, count for this entity.
- 44 (4W) Only contacts made March 1, 2000, and after, count for this entity.
- 45 (FK/C) Only contacts made March 23, 2000, and after, count for this entity.
- 46 (VP6) Only contacts made November 16, 2001, and after, count for this entity.
- 47 (40) Only contacts made June 28, 2006, and after, count for this entity.
- 48 (KH8) Only contacts made July 22, 2006, and after, count for this entity.
- 49 (FJ) Only contacts made December 14, 2007, and after, count for this entity.
- 50 (PJ2) Only contacts made starting 0400 UTC October 10, 2010, or after, count for this entity.
- 51 (PJ4) Only contacts made starting 0400 UTC October 10, 2010, or after, count for this entity.
- 52 (PJ5, 6) Only contacts made starting 0400 UTC October 10, 2010, or after, count for this entity.
- 53 (PJ7) Only contacts made starting 0400 UTC October 10, 2010, or after, count for this entity.
- 54 (Z8) Only contacts made July 14, 2011, or after, count for this entity.
- F Indicates current list of entities for which QSLs may be forwarded by the ARRL membership Outgoing QSL Service.
- T Indicates entities with which US Amateurs may legally handle third-party message traffic.
- S Also 3Y, 8J1, AT0, DP0, FT8Y, LU, OR4, VK0, R1AW, VP8, ZL5, ZS1, ZX0, etc. QSL via country under whose auspices the particular station is operating. The availability of a third-party traffic agreement and a QSL Bureau applies to the country under whose auspices the particular station is operating.

## DELETED ENTITIES

*Reproduced courtesy ARRL July 2011*

Deleted Entities Total: 61

Credit for any of these entities can be given if the date of contact in question agrees with the date(s) shown in the corresponding footnote.

Notes	Prefix	Entity	Zone Cont.	ITU	CQ	Entity Code
2		Blenheim Reef	AF	41	39	23
3		Geyser Reef	AF	53	39	93
4		Abu Ail Is.	AS	39	21	2
1,5	1M	Minerva Reef	OC	62	32	178
6	4W	Yemen Arab Rep.	AS	39	21	154
7	7J1	Okino Tori-shima	AS	45	27	194
8	8Z4	Saudi Arabia/Iraq Neut. Zone	AS	39	21	226
9	8Z5,9K3	Kuwait/Saudi Arabia Neut. Zone	AS	39	21	68
10	9S4	Saar	EU	28	14	210
11	9U5	Ruanda-Urundi	AF	52	36	208
1,12	AC3	Sikkim	AS	41	22	231
1,13	AC4	Tibet	AS	41	23	268
14	C9	Manchuria	AS	33	24	164
15	CN2	Tangier	AF	37	33	264
16	CR8	Damao, Diu	AS	41	22	42
16	CR8	Goa	AS	41	22	101
17	CR8,CR10	Portuguese Timor	OC	54	28	200
18	DA-DM	Germany	EU	28	14	81
19	DM,Y2-9	German Dem. Rep.	EU	28	14	229
20	EA9	Ifni	AF	37	33	113
21	FF	French West Africa	AF	46	35	59
22	FH,FB8	Comoros	AF	53	39	39
23	F18	French Indo-China	AS	49	26	58
24	FN8	French India	AS	41	22	67
25	FQ8	Fr. Equatorial Africa	AF	47,52	36	57
26	HK0	Bajo Nuevo	NA	11	8	19
26	HK0,KP3	Serrana Bank &		11	7	228

Notes	Prefix	Entity	Zone Cont.	ITU	CQ	Entity Code
	KS4	Roncador Cay				
27	I1	Trieste	EU	28	15	271
28	I5	Italian Somaliland	AF	48	37	115
29	JZ0	Netherlands N. Guinea	OC	51	28	184
	KR6,8,JR6	Okinawa (Ryukyu Is.)	AS	45	25	193
30	KA6					
31	KS4	Swan Is.	NA	11	7	261
32	KZ5	Canal Zone	NA	11	7	28
33	OK-OM	Czechoslovakia	EU	28	15	218
34	P2,VK9	Papua Territory	OC	51	28	198
34	P2,VK9	Terr. New Guinea	OC	51	28	267
35	PJ	Bonaire, Curacao	SA	11	9	85
35	PJ	St. Maarten, Saba, St. Eustatius	NA	11	8	255
36	PK1-3	Java	OC	54	28	119
36	PK4	Sumatra	OC	54	28	258
36	PK5	Netherlands Borneo	OC	54	28	183
36	PK6	Celebe & Molucca Is.	OC	54	28	30
37	ST0	Southern Sudan	AF	47,48	34	244
38	UN1	Karelo-Finnish Rep.	EU	19	16	128
39	VO	Newfoundland, Labrador	NA	9	2,5	186
40	VQ1,5H1	Zanzibar	AF	53	37	307
41	VQ6	British Somaliland	AF	48	37	26
42	VQ9	Aldabra	AF	53	39	8
42	VQ9	Desroches	AF	53	39	44
42	VQ9	Farquhar	AF	53	39	55
43	VS2,9M2	Malaya	AS	54	28	155

43	VS4	Sarawak	OC	54	28	220
44	VS9A,P,S	People's Dem. Rep. of Yemen	AS	39	21	243
45	VS9H	Kuria Muria I.	AS	39	21	139
46	VS9K	Kamaran Is.	AS	39	21	127
43	ZC5	British North Borneo	OC	54	28	25

47	ZC6,4X1	Palestine	AS	39	20	196
48	ZD4	Gold Coast, Togoland	AF	46	35	102
49	ZS0,1	Penguin Is.	AF	57	38	493
50	ZS9	Walvis Bay	AF	57	38	488

#### NOTES:

- 1 Unofficial prefix.
- 2 (Blenheim Reef) Only contacts made from May 4, 1967, to June 30, 1975, count for this entity. Contacts made July 1, 1975, and after, count as Chagos (VQ9).
- 3 (Geysey Reef) Only contacts made from May 4, 1967, to February 28, 1978, count for this entity.
- 4 (Abu Ail Is.) Only contacts made March 30, 1991, and before, count for this entity.
- 5 (1M) Only contacts made from July 15, 1972, and before, count for this entity. Contacts made July 16, 1972, and after, count as Tonga (A3).
- 6 (4W) Only contacts made before May 21, 1990, and before, count for this entity.
- 7 (7J1) Only contacts made May 30, 1976, to November 30, 1980, count for this entity. Contacts made December 1, 1980, and after, count as Ogasawara (JDI).
- 8 (8Z4) Only contacts made December 25, 1981, and before, count for this entity.
- 9 (8Z5,9K3) Only contacts made December 14, 1969, and before, count for this entity.
- 10 (9S4) Only contacts made March 31, 1957, and before, count for this entity.
- 11 (9U5) Only contacts made from July 1, 1960, to June 30, 1962, count for this entity. Contact made July 1, 1962, and after, count as Burundi (9U) or Rwanda (9X).
- 12 (AC3) Only contacts made April 30, 1975, and before, count for this entity. Contacts made May 1, 1975, and after, count as India (VU).
- 13 (AC4) Only contacts made May 30, 1974, and before, count for this entity. Contacts made May 31, 1974, and after, count as China (BY).

- 14 (C9) Only contacts made September 15, 1963, and before, count for this entity. Contacts made September 16, 1963, and after, count as China (BY).
- 15 (CN2) Only contacts made June 30, 1960, and before, count for this entity. Contacts made July 1, 1960, and after, count as Morocco (CN).
- 16 (CR8) Only contacts made December 31, 1961, and before, count for this entity.
- 17 (CR8,CR10) Only contacts made September 14, 1976, and before, count for this entity.
- 18 (DA-DM) Only contacts made September 16, 1973, and before, count for this entity. Contacts made September 17, 1973, and after, count as either FRG (DADL) or GDR (Y2-Y9).
- 19 (DM,Y2-9) Only contacts made from September 17, 1973, to October 2, 1990 count for this entity. On October 3, 1990, the GDR became part of the FRG.
- 20 (EA9) Only contacts made May 13, 1969, and before, count for this entity.
- 21 (FF) Only contacts made August 6, 1960, and before, count for this entity.
- 22 (FH,FB8) Only contacts made July 5, 1975, and before, count for this entity. Contacts made July 6, 1975, and after, count as Comoros (D6) or Mayotte (FH).
- 23 (F18) Only contacts made December 20, 1950, and before, count for this entity.
- 24 (FN8) Only contacts made October 31, 1954, and before, count for this entity.
- 25 (FQ8) Only contacts made August 16, 1960, and before will count for this entity.
- 26 (HK,KP3,KS4) Only contacts made September 16, 1981, and before, count for this entity. Contacts made September 17, 1981, and after, count as San Andres (HK).
- 27 (11) Only contacts made March 31, 1957, and before, count for this entity.
- 28 (15) Only contacts made June 30, 1960, and before, count for this entity.
- 29 (JZ) Only contacts made April 30, 1963, and before, count for this entity.
- 30 (KR6,8,JR6,KA6) Only contacts made May 14, 1972, and before, count for this entity. Contacts made May 15, 1972, and after, count as Japan (JA).
- 31 (KS4) Only contacts made August 31, 1972, and before, count for this entity. Contacts made September 1, 1972, and after, count as Honduras (HR).
- 32 (KZ5) Only contacts made September 30, 1979, and before, count for this entity.
- 33 (OK-OM) Only contacts made December 31, 1992, and before, count for this entity.
- 34 (P2,VK9) Only contacts made September 15, 1975, and before, count for this entity. Contacts made September 16, 1975, and after, count as Papua New Guinea (P2).
- 35 (PJ) Only contacts made October 9, 2010, and before, count for this entity.
- 36 (PK1-6) Only contacts made April 30, 1963, and before, count for this entity. Contact made May 1, 1963, and after, count as Indonesia.
- 37 (ST0) Only contacts made between May 7, 1972 and December 31, 1994, count for this entity.
- 38 (UN1) Only contacts made June 30, 1960, and before, count for this entity. Contacts made July 1,

- 1960, and after count as European RSFSR (UA).
- 39 (VO) Only contacts made March 31, 1949, and before, count for this entity. Contacts made April 1, 1949, and after, count as Canada (VE).
- 40 (VQ1,5H1) Only contacts made May 31, 1974, and before, count for this entity. Contacts made June 1, 1974, and after, count as Tanzania (5H).
- 41 (VQ6) Only contacts made June 30, 1960, and before, count for this entity.
- 42 (VQ9) Only contacts made June 28, 1976, and before, count for this entity. Contacts made June 29, 1976, and after, count as Seychelles (S7).
- 43 (VS2,VS4,ZC5,9M2) Only contacts made September 15, 1963, and before, count for this entity. Contacts made September 16, 1963, and after, count as West Malaysia (9M2) or East Malaysia (9M6,8).
- 44 (VS9A,P,S) Only contacts made before May 22, 1990, and before, count for this entity.
- 45 (VS9H) Only contacts made November 29, 1967, and before, count for this entity.
- 46 (VS9K) Only contacts made on March 10, 1982, and before, count for this entity.
- 47 (ZC6,4X1) Only contacts made June 30, 1968, and before, count for this entity. Contacts made July 1, 1968, and after, count as Israel (4X).
- 48 (ZD4) Only contacts made March 5, 1957, and before, count for this entity.
- 49 (ZS0, 1) Only contacts made February 29, 1994, and before, count for this entity.
- 50 (ZS9) Only contacts made from September 1, 1977 to February 28, 1994, count.

## PREFIX CROSS REFERENCES

Reproduced Courtesy ARRL, July 2012

#### Continent

AF = Africa  
AN = Antarctica  
AS = Asia  
EU = Europe  
NA = North America  
OC = Oceania  
SA = South America

#### Zone Notes

(A) 33, 42, 43, 44  
(B) 67, 69-74  
(C) 12, 13, 29, 30, 32, 38, 39  
(D) 12, 13, 15  
(E) 19, 20, 29, 30

(F) 20-26, 30-35, 75  
(G) 16, 17, 18, 19, 23  
(H) 2, 3, 4, 9, 75  
(I) 55, 58, 59

A8 = EL  
AC (before 1972) = A5  
AH = KH  
AL7 = KL7  
AM-AO = EA  
AT-AW = VU  
AX = VK  
AY-AZ = LU  
CF-CK = VE  
CL = CO  
CQ-CS = CT

CR3 (before 1974) = J5  
CR4 (before 1976) = D4  
CR5 (before 1976) = S9  
CR6 (before 1976) = D2  
CR7 (before 1976) = C9  
CR9 (before 1985) = XX9  
CT2 (before 1986) = CU  
CX0 = CE9/VP8  
CY-CZ = VE  
CY0 (before 1985) = CY9  
D7 = HL  
DM-DT (before 1980) = Y2-9  
DS-DT = HL  
E2 = HS  
EA0 (before 1969) = 3C  
EK, EM-EO, ER-ES, EU-EZ = U

ER (after 1992) = UO  
EU (after 1991) = UC  
FA-FF (after 1983) = F  
FA (before 1963) = 7X  
FB8 (before 1961) = 5R  
FB8 (before 1985) = FT  
FC (before 1985) = TK  
FD8 (before 1961) = 5V  
FE8 (before 1961) = TJ  
FL (before 1978) = J2  
FU8 (before 1982) = YJ  
GB = G  
GC (before 1977) = GJ or GU  
H2 = 5B  
H3 = HP  
H5 (Bophutatswana) = ZS



H7 = YN	S8 (Transkei) = ZS	VR2 (after 1991) = VS6	2J = GJ
HE = HB	T4 = CO	VR3 (before 1980) = T32	2M = GM
HM (before 1982) = HL	T4 (Venda) = ZS	VR4 (before 1979) = H4	2U = GU
HT = YN	T9 = E7	VR5 (before 1971) = A3	2W = GW
HU = YS	TH, TM, TO-TQ, TV-TX = F	VR6 (before 1998) = VP6	3B-3C (before 1968) = VE
HW-HY = F	UB (before 1994) = UZ	VR8 (before 1979) = T2	3D6 (before 1988) = 3DA
J4 = SV	UC (before 1991) = EU	VS1 (before 1966) = 9V	3G = CE
KA1 = JD1	UD (before 1994) = 4J	VS5 (before 1985) = V8	3Z = SP
KA2AA-KA9ZZ = JA	UF (before 1994) = 4L	VS6 (before 1997) = VR	4A-4C = XE
KB6 (before 1979) = KH1	UG (before 1994) = EK	VS7 (before 1949) = 4S	4D-4I = DU
KC4 (Navassa) = KP1	UH (before 1993) = EZ	VS9M = 8Q	4J-4L = U
KC6 (before 1990) = V6	UI (before 1994) = UJ	VS9O (before 1961) = A4	4J (after 1991) = EK
KC6 (before 1998) = T8	UJ (before 1993) = EY	VX-VY = CY0/VE	4J1F (before 1994) = R1MV
KG6 (before 1979) = KH2	UL (before 1994) = UN	WH = KH	4K (before 1994) = UA
KG6I (before 1970) = JD1	UM (before 1993) = EX	WL7 = KL7	4K1 (before 1994) = CE9/KC4
KG6R, S, T (before 1979) = KH0	UO (before 1994) = ER	WP = KP	4K2 (before 1994) = R1FJ
KH7 (before 1996) = KH7K	UP (before 1991) = LY	XJ-XO = VE	4K3 (before 1994) = UA
KJ6 (before 1979) = KH3	UQ (before 1992) = YL	XP = OX	4K4 (before 1994) = UA0
KM6 (before 1979) = KH4	UR (before 1991) = ES	XQ-XR = CE	4L (after 1991) = UF
KP4 (Desecheo) = KP5	V9 (Venda) = ZS	XS = BY	4M = YV
KP6 (before 1979) = KH5	VA-VG = VE	XV = 3W	4N-4O = YU
KS6 (before 1979) = KH8	VH-VN = VK	XX7 (before 1976) = C9	4T = OA
KV4 (before 1979) = KP2	VK9 (Nauru) = C2	YU2 (before 1992) = 9A	4U1VIC = OE
KW6 (before 1979) = KH9	VP1 (before 1982) = V3	YU3 (before 1992) = S5	4V = HH
KX6 (before 1990) = V7	VP2A (before 1982) = V2	YU4 (before 1992) = T9	5J-5K = HK
L2-9 = LU	VP2D (before 1979) = J7	YU5 (before 1992) = Z3	5L-5M = EL
M = G	VP2G (before 1975) = J3	ZB1 (before 1965) = 9H	6C = YK
M1 (before 1984) = T7	VP2K (before 1984) = V4 or VP2E	ZD1 (before 1962) = 9L	6D-6J = XE
MP4B (before 1972) = A9	VP2L (before 1980) = J6	ZD2 (before 1961) = 5N	6K-6N = HL
MP4M (before 1972) = A4	VP2S (before 1980) = J8	ZD3 (before 1966) = C5	6O = T5
MP4Q (before 1972) = A7	VP3 (before 1967) = 8R	ZD5 (before 1969) = 3DA	6T-6U = ST
MP4T, D (before 1972) = A6	VP4 (before 1963) = 9Y	ZD6 (before 1965) = 7Q	7A-7I = YB
NH = KH	VP5 (Jamaica) = 6Y	ZE (before 1981) = Z2-9	7G (before 1967) = 3X
NL7 = KL7	VP5E = VP2E	ZK1 (after June 2006) = E5	7J-7N = JA
NP = KP	VP6 (before 1967) = 8P	ZK9 (1983) = ZK2	7J = JA1 or JD1
OQ (before 1961) = 9Q	VP7 (before 1974) = C6	ZM6 (before 1963) = 5W	7S = SM
P3 = 5B	VQ2 (before 1965) = 9J	ZM7 (before 1984) = ZK3	7Z = HZ
P4 (before 1986) = PJ	VQ3 (before 1962) = 5H	ZS3 (before 1991) = V5	8A-8I = YB
PX (before 1970) = C3	VQ4 (before 1964) = 5Z	ZS7 (before 1969) = 3D6	8J-8N = JA
RA, RN = UA	VQ5 (before 1963) = 5X	ZS8 (before 1967) = 7P	8O = A2
RB-RR = UB-UR	VQ8 (before 1969) = 3B	ZS9 (before 1967) = A2	8S = SM
RS = U	VQ8 (Chagos) = VQ9	ZV-ZZ = PY	9A (before 1984) = T7
RT = UB	VQ9 (Seychelles) = S7	2D = GD	9B-9D = EP
RU-RX = U	VR1 (before 1980) = T3	2E = G	9E-9F = ET
S4 (Ciskei) = ZS	VR2 (before 1971) = 3D2	2I = GI	

## AMATEUR SATELLITES

**Satellite operation** is a fascinating and challenging aspect of amateur radio. There are a variety of modes both digital and analog that can be used and a choice of satellites to communicate through. Equipment required for satellite operation can range from a dual band hand held transceiver with a hand held Yagi antenna, up to sophisticated ground stations with computer-controlled transceivers and antenna systems.

The amateur satellite service is recognised by the ITU. There are frequency allocations within the amateur bands for satellite operation, [see the New Zealand Amateur Radio Bandplans].

The first amateur radio satellite, was OSCAR 1 launched on the 12<sup>th</sup> December 1961 by a Thor Agena B rocket from Vandenberg

Air Force Base, California. Coincidentally the date was also significant because it was the 60<sup>th</sup> anniversary of the first radio transmission across the Atlantic Ocean by Guglielmo Marconi. It is impressive that amateur radio hams were able to build a successful satellite only four years after Sputnik 1, the first ever man made satellite, which was launched on the 4<sup>th</sup> October 1957.

OSCAR 1 was the first non-governmental satellite ever launched. It transmitted "HI" in Morse code with 140 milliwatts of power on a frequency of 144.983 MHz. As a scientific experiment, the speed of the cw message was used to indicate the temperature inside the satellite.

Since 1961 there have been more than 120 satellites launched carrying transponders or beacons

on amateur radio frequencies. Many of these are small 'cubesats' built by Universities or other interest groups. While these often use amateur radio frequencies for control and telemetry they are of less interest than the satellites built by ham radio enthusiasts which carry transponders for use by ham radio operators, world wide. To differentiate between these two classes of satellites, I refer to the satellites built by Universities etc. as "amateur satellites" and the satellites built by radio hams as "amateur radio satellites" or 'HAMSATS'. There are currently 10 HAMSATS in orbit with active analog transponders and 38 with digital transponders or beacons.

Most amateur radio satellites (HAMSATS) are awarded an OSCAR number as soon as the satellite is in orbit and

operational. OSCAR stands for Orbital Satellite Carrying Amateur Radio. So far there have been 68 OSCAR satellites, originating from 23 countries. OSCAR numbers are issued sequentially and the designation usually gives a clue as to the origin of the satellite. For example AO-7 is from AMSAT North America, FO-29 is Fuji OSCAR from Japan, SO-50 is from Saudi Arabia, VO-52 is from India, and UO-11 is from University of Surrey. As well as the OSCAR satellites, there was a series of 18 Russian built amateur radio satellites, which were known as Radiosputnik or "RS" satellites. Many of the RS satellites were amateur radio transponders physically attached to commercial communications satellites and were not issued with OSCAR numbers. RS-30 named "Yubileiny", Russian for

jubilee was launched on May 23, 2008. The satellite celebrates the 50th anniversary of 'Sputnik' the first man made space satellite. Amateur radio has also been an important part of manned space exploration. The Russian MIR spacecraft (1986-2001) carried ham radio and SSTV equipment. Between 1983 and 1999, ham radio licensed astronauts participated in the SAREX programme during 28 space shuttle flights. They carried out 1000s of QSOs with hams on Earth and made the first space to space ham QSOs to chat to other hams aboard the MIR space station. Currently the International Space Station (ISS) carries ARISS -amateur radio aboard ISS, which is used for educational conversations with school children around the world, QSOs between hams and the space station crew, an FM repeater, SSTV (slow scan television) pictures, packet radio and APRS (amateur radio positioning system). So if you are lucky you could chat to an Astronaut on the space station. Probably the most unique HAMSAT so far is 'SuitSat', a redundant Russian Orlan spacesuit fitted with a radio transmitter, some instrumentation, and padded out with unwanted laundry. The 'Expedition 12' crew launched SuitSat from the international space station on February 3<sup>rd</sup> 2006. AMSAT designated SuitSat as AMSAT OSCAR 54 (AO-54). The satellite transmitted a digital recording of the voices of school children on 145.990 MHz. Unfortunately the signal was much weaker than expected, probably due to a broken antenna. SuitSat was last heard on the 18<sup>th</sup> of February 2006 and has now burned up in the Earth's atmosphere. There are plans for more satellites to be launched from the ISS and there are many small educational and amateur radio cubesats launched into low Earth orbits every year using mainly Russian and French rockets. Amateur satellites can be grouped according to their orbit. High Earth Orbit (HEO) satellites usually have large elliptical (Molniya) orbits. For example AO-40 has an apogee (farthest point from Earth) of 58,776km and a perigee (nearest point to Earth) of 1044km. The "footprint" or coverage area of HEO satellites is almost a complete hemisphere of the Earth, a ZL station could expect to work stations in all of Europe, Asia, the Americas and parts of Africa. Unfortunately neither of the two most successful HEO HAMSATS

are still in operation. In January 2004, after three successful years in orbit, AO-40 suffered failure of all transponders due to failure of the main battery. Low Earth Orbit (LEO) satellites have smaller elliptical or near circular orbits typically with a perigee of around 680km - 800km and an apogee of 800-1320km. Since the LEO satellites are closer to Earth, the coverage area or "foot print" is much smaller than the foot print of HEO satellites. A ham in New Zealand can expect to be able to work all of New Zealand and Australia through the LEO OSCAR satellites. The ISS has a nearly circular orbit 333 perigee - 348km apogee. There are many exciting HAMSAT projects in progress around the world. In Germany a team is working on P3E "Express" a high orbit satellite which will carry a whole range of transponders plus a camera and other experiments. The local New Zealand AMSAT group is working on KiwiSAT a micro satellite which will carry amateur radio FM and linear transponders and a scientific experiment in Small Satellite Attitude Control.

**Modes and Bands**

The amateur satellites of most interest to the ham radio community are those which carry transponders for relaying signals back to Earth. Some satellites carry linear transponders, which allow multiple users and transmission types, including SSB, CW, FM, SSTV, and PSK. Some have FM voice transponders which work like cross band repeaters and some satellites carry digital transponders, which receive, regenerate and then re-transmit digital data. Digital transponders are usually used for packet bulletin board systems (BBS), digipeaters and APRS. Most satellite operation uses the satellite portions of the 2m and 70cm bands. Currently only AO-51 "Echo" has the capability to operate on L band (1268MHz) and S band (2401MHz). The P3E "Express" satellite is proposed to have transponders on bands ranging from 29MHz to 47GHz. Satellite transponders are often referred to by 'mode' rather than referring to the type of transmission SSB, FM etc. The mode relates to the frequency bands used by the satellite transponder. VU mode means that the satellite uplink is on VHF band (2m) and downlink is on UHF (70cm). Conversely UV mode means that the satellite uplink is on UHF band (70cm) and downlink is on VHF (2m). LS mode has a 1268MHz uplink and a 2401MHz downlink.

Some linear transponders are "reverse tracking" so that as the uplink frequency increases, the downlink frequency decreases. Generally this type of transponder is also "inverted", the transponder reverses the sidebands so that LSB input to the satellite becomes USB on the downlink.

**Equipment requirements for working HAMSATS .**

The minimum requirement for ground station transceivers is a dual band FM handheld, but for serious satellite work a multi-mode transceiver capable of full duplex crossband operation (2m / 70cm), such as the Yaesu FT-847, Icom IC-910H or Kenwood TS2000 is desirable. Other multi-mode transceivers such as the IC-9100, FT-857 and FT-897 that can be controlled via PC software are also very suitable. Alternatively the station can consist of separate FM or multi mode transceivers for 2m and 70cm. Some satellites have a 'mode A' downlink, which requires a 10m HF receiver. L band operation can be achieved with a transmit converter, or some transceivers have optional built in L band modules. S band operation is usually achieved using an S band to 2m, or S band to 70cm down-converter mounted at the antenna.

For working LEO satellites Yagi antennas with 5 to 10 elements on 2m and 12 elements on 70cm are quite acceptable. It is best if these can be pointed at the satellite using a PC controlled azimuth and elevation rotator, but many operators track the satellites manually. A popular starting point is the 'Arrow' antenna, a simple hand held Yagi made with wire elements mounted on a broom handle. These can be made for a few dollars and designs are available on the Internet. Almost any antenna capable of working on 70cm and 2m will get you started on the FM satellites when they are at high elevations. There is a significant advantage in using circular polarised antennas for satellite work. Circular polarised antennas minimise the effects of cross polarisation fading caused by the satellites' changing position, possible spin modulation (fading due to satellite rotation), and on HEO satellites a small amount of Faraday rotation. The convention is to use antennas made with right hand circular polarisation (rhcp). For HEO satellite operation, high gain circular polarised (rhcp) antennas such as crossed Yagis, loop Yagis, or helix antennas are required. For L band (23cm), helix, or parabolic dish antennas are usually used. For S band

(13cm) operation parabolic dish antennas fed with small helix or circular polarised patch feeds are normal, although long helix antennas are sometimes used.

**Satellite tracking**

To work stations through the HAMSATS , you need to know when the satellite will be above the horizon and where to point your antenna(s). Most satellite operators use one of the many satellite tracking programs available on the Internet. Programs include Instant Track, Wisp, Orbitron, Nova, Winorbit, Satscape and SatPC32. The current favourite is SatPC32, which offers rig control with automatic Doppler correction, rotator control, tracking of multiple satellites, display of the ground track and satellite coverage footprint. If you have not installed tracking software, you can get a display of the next 10 passes for many amateur satellites by using the 'Passes' tool on the AMSAT NA web site. Three things are critical for accurate satellite tracking. Firstly the tracking program will need your QTH location, (latitude and longitude). Some software can calculate your location from your Maidenhead grid square. Secondly the program will need up to date Kepler data, which can be downloaded from AMSAT, Celestrak or other web sites. The Kepler data describes the orbit of the satellites. Finally the clock on your PC needs to be accurate. A two-minute error on your PC clock could result in your antenna pointing 36 degrees away from the true position of the satellite and of course the Doppler adjustment would also be way out. Freeware utilities such as Dimension 4 can reset your PC clock very accurately. Kepler data should be updated at least monthly.

**Satellite Glossary**

**OSCAR** – Orbital Satellite Carrying Amateur Radio

**AOS** – acquisition of signal. Time the satellite appears above the horizon

**LOS** – loss of signal. Time the satellite sets below the horizon

**Uplink** – the signal you send to the satellite

**Downlink** – the signal you receive from the satellite

**Mode** – frequency band of uplink and downlink (UV, VU, LS, VA)

**Pass** – the time the satellite is above the horizon and can be used

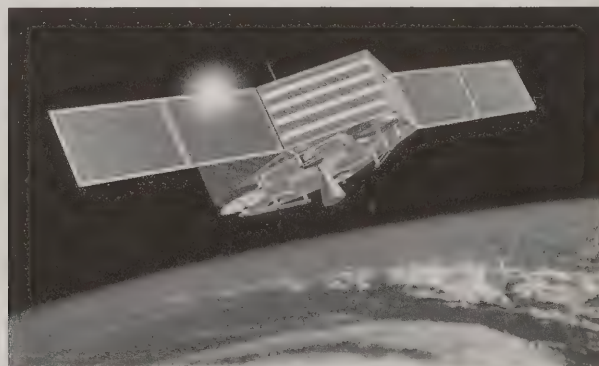
**Passband** – frequency bandwidth of a transponder (FO-29 has a 100kHz passband)

**Beacon** – most satellites have a cw or telemetry beacon transmitter on a



435.910	FO-29	Fuji-OSCAR 29	Digitalker Downlink	FM	Unknown
145.900 - 146.000	FO-29	Fuji-OSCAR 29	Linear Transponder Uplink	SSB/CW	Operational
435.800 - 435.900	FO-29	Fuji-OSCAR 29	Linear Transponder Downlink	SSB/CW	Operational
437.345	FO-69	Fastrac 'Sara Lily'	FM telemetry (Packet not opr)	FM	Operational
145.825	FO-70	Fastrac 2 'Emma'	FM telemetry (Packet not opr)	FM	Operational
145.890	GO-32	Gurwin OSCAR-32	PacSat BBS Uplink	FSK	Semi-Operational
435.225	GO-32	Gurwin OSCAR-32	PacSat BBS Downlink	FSK	Semi-Operational
435.325	GO-32	Gurwin OSCAR-32	TLM Beacon Downlink	FM	Semi-Operational
435.790	HO-68	Hope Sat	Beacon OK, transponders NOP	CW	Operational
437.345	MO-72	MagyarSat OSCAR72	2FSK downlink telemetry	2FSK	Operational
145.827	NO-44	Navy-OSCAR 44	APRS Uplink	AFSK	Semi-Operational
29.353	RS-15	Radio-Sputnik 15	Beacon Downlink	CW	Semi-Operational
29.399	RS-15	Radio-Sputnik 15	Beacon Downlink	CW	Semi-Operational
145.858 - 145.898	RS-15	Radio-Sputnik 15	Linear Transponder Uplink	SSB/CW	Semi-Operational
29.354 - 29.394	RS-15	Radio-Sputnik 15	Linear Transponder Downlink	SSB/CW	Semi-Operational
435.352	RS-22	RS-22	TLM Beacon Downlink	FM	Operational
435.215	RS-30	RS-30	TLM Beacon Uplink	CW	Operational
435.315	RS-30	RS-30	TLM Beacon Uplink	CW	Operational
437.910	SO-33	SEDSat-OSCAR 33	Packet Downlink	FSK	Semi-Operational
1266.687	SO-33	SEDSat-OSCAR 33	Packet Uplink	FSK	Semi-Operational
145.850	SO-50	Saudi-OSCAR 50	FM Voice Repeater Uplink	FM	Operational
436.795	SO-50	Saudi-OSCAR 50	FM Voice Repeater Downlink	FM	Operational
145.826	UO-11	UoSat OSCAR 11	TLM Beacon Downlink	FM	Semi-Operational
145.860	VO-52	VUSat OSCAR-52	Beacon Uplink	CW	Operational
145.936	VO-52	VUSat OSCAR-52	Beacon Downlink	Carrier	Operational
145.925 - 145.875	VO-52	VUSat OSCAR-52	Linear Transponder Downlink	SSB/CW	Operational
145.930 - 145.870	VO-52	VUSat OSCAR-52	Linear Transponder Downlink	SSB/CW	Operational
435.220 - 435.280	VO-52	VUSat OSCAR-52	Linear Transponder Uplink	SSB/CW	Operational
435.225 - 435.275	VO-52	VUSat OSCAR-52	Linear Transponder Uplink	SSB/CW	Operational

Satellites listed as active by AMSAT NA - August 2012



*Above: Satellite AO-40*

*Left: Kiwi-Sat*

# AN INTRODUCTION TO THE WORLD OF DX

by Lee Jennings ZL2AL  
With updates by  
Graeme Hunt ZL1ANH/ZL50GH/ZL1T

## DXing is addictive

The greatest lure in amateur radio is to contact someone else in another country. When you first start out into the world of DXing, DX may be 100km but later you will work into every corner of the planet. With some hams, it becomes an absolute obsession and they will go to any length to contact that country they haven't worked yet. For others, it is a pleasure to rag chew with an amateur in a foreign country and to learn more about that country and its culture. DXers often end up meeting other DXers when they travel and many lifelong friendships are made this way. DXing is a competitive sport. You will find out the moment that you hear some rare DX that a thousand other hams heard that same station and are also calling at the same instant. The problem is that many of your competitors are outstanding operators with high power, excellent antenna systems and vast experience. Most of your competitors are average operators with average stations and antennas and they are easy to compete with. You just have to be a bit more cunning with your skills but eventually you can work up to competing with the top group. That rare DXpedition will usually work the big guns first and then you can easily make the contact at the end of their stay at the rare location. Currently there are 338 DXCC "Entities" "eligible for the ARRL DXCC award program. DXCC is the premier award in ham radio and entry to the "Club" may be gained by working and confirming 100 entities. An Entity can be as large as Australia or as small as St Peter and Paul Rocks out in the South Atlantic Ocean. There are rules that govern what constitutes an "Entity" and they may be found on the ARRL Website where you can find the rules for the various awards and download the application forms. CQ Magazine in the USA that runs the Worked All Zones awards program and sponsors major contests throughout the



year has the rules on their website also. Usually you start off with trying to work the first one hundred countries or entities and that will be a milestone for you. It will teach you how to get involved with a pileup and how to be a bit cunning when you do. It will teach you that other DXers in other countries may not have the same sense of fair play as you do. The second 100 countries are a little more difficult to work. Achieving 300 countries is very difficult and will usually take many years for a variety of reasons including sunspot cycles, the rarity of the country and how often its government will allow amateurs to operate there. Currently (2012) there are 338 DXCC Entities and the last 35 entities are extremely difficult to work. Very few ZL amateurs have managed to do it. But the challenge is always there and it becomes a passion to achieve it.

## Strategies for successful DXing

There are some proven strategies that work. Listen to the operator and find out where he is listening and if he is working split frequencies. Working "split" is not difficult, just different. It's a new skill for you to learn. Normal contacts – or qsos are usually held on the same – or simplex frequency. Rare DX will operate

split to reduce QRM. They will transmit on one frequency and listen away from that frequency. On CW the DX will usually listen 1kHz to 5kHz above his transmitting frequency. SSB stations will usually listen 5kHz or more above their transmitting frequency. With extremely rare DX, the DX may be listening up much higher, sometimes as much as 25kHz. If your transceiver has dual VFOs, listen on one and transmit on the other. If you haven't got a second VFO put your transmitter on the frequency where the dx is listening, and use the clarifier to hear the DX.

Find out where the thousands of other operators are transmitting and avoid the pack. Position yourself just off the edge of the pack. Refine your timing so that you will be heard in a "gap" rather than in with the pack. Placement and timing is everything. Your signal should be slightly out of the pack so you will be noticed and your call should be slightly out of sync with the pack and just delayed a bit so that he will hear you start your call but not delayed long enough that you are calling on top of the guy the DX station has already decided to work and is answering. Successful experienced DXers are extremely skilful with their timing and consequently work

the DX. You may not be heard on your first or second call or even after a few hours of calling. Be patient! Sometimes it's an exercise in pure frustration but persistence usually wins and it's an absolute joy when you snag that new country. Top level DXing is not easy but you will learn that amateur radio is more than inhabiting your local 2 metre repeater. You will also be rewarded with friendships around the world and an understanding of other cultures.

## Is CW worth the effort?

It really is true that it's easier to work DX on CW than on Phone because there are fewer stations clamouring for the attention of a DX station on CW. CW will still be around for the foreseeable future in spite of recent changes in amateur licence regulations around the world. Weak CW signals are more readable than weak Phone signals. Hone your CW skills at this site <http://www.dxatlas.com/MorseRunner/>. This is a great free programme that is a mock contesting/pileup station inside your computer – no radio needed. It lets you set the speed and QRM levels and a few hours a day will get your skills to the stage where a real QSO isn't so daunting. DX stations often run 20 wpm or more and while most of them are courteous and will come back to a station calling at 12 or 15wpm, it's very satisfying to be able to work them at the speed they're calling CQ. Life is much easier with an electronic keyer as it takes the work out of sending your call over and over. There is nothing worse than operating with a pair of uncomfortable, ill fitting, harsh sounding headphones. Invest in a good set of headphones to help you dig out the weak ones and avoid fatigue. A better idea is to buy a quality boom microphone headset with a good sounding microphone cartridge.

## Work the contests

Contests can be intimidating, but



your best chance for working new countries is often during the DX contests. Contest groups often will activate multi-multi stations in rare countries and they are easy to work. I recall working CN2R in Morocco on 80m a few years ago. Re was S9+ and begging for 80 m contacts and very easy to work. You don't do not have to work the entire contest, nor do you have to send in the logs for scoring. Figure out what information they're expecting you to exchange with them, either by listening to several contest QSOs or by reading the contest rules on [www.contesting.com](http://www.contesting.com) then just jump in and start working stations.

### What bands to operate

The seven popular amateur radio bands offer the DXer propagation to most parts of the world most of the time. When the sunspot count is between the eleven year peaks, the higher bands like 10, 12, 15, 20 M are poor and opportunities are limited. 40M and 80M come into their own and some excellent DXing abounds providing you have good antennas. DXing is more difficult on 80 and 160m because the ambient noise levels are often intolerable in urban areas. When the propagation is right and the bands are open at sunrise and sunset, 80 and 160m can be extremely rewarding with worldwide contacts. We are fortunate here in the Asia Pacific region as many rare DXpeditions take place and are easy to work on the lower bands. When the sunspots reach maximum every eleven years the higher bands are magic. In the current peak of 2012 10, 12 and 15m are often open. It is relatively easy to work 100 countries during a weekend contest. Having a ZL call is a wonderful asset. ZLs are reasonably rare in other parts of the world and there are not that many ZL DXers to compete with. ZLs are often the first "real" DX station that Europeans work. ZL DXers are respected around the world and we have some world class Kiwi DXers amongst us. It is not uncommon to call a CQ on 15 or 20M and generate a pileup of Europeans or North Americans that may go on for hours.

### Operating aids

The DXer has far more tools at his disposal than he had 30 or 40 years ago. Then, you heard a rumour, read monthly DX magazines or received a phone call from a trusted friend. You listened daily, you waited and finally you would hear that weak rare station and attempt to work him with primitive valve equipment. Today's modern DXers have computers with the Internet based newsgroups, real time packet clusters, propagation prediction programs and information not dreamt of by old timers in the game. Today one knows where and when the rare DX will operate. With a few mouse clicks the modern well equipped station will change the radio to that frequency and mode, track the amplifier to the right band, select the correct antenna system, turn the beam to the heading and set his call up in the logging program in a few seconds. Sounds easy! The reality is that you still have to use your skills to get your call in his electronic logbook. And it doesn't get any easier as thousands of other hams have the same technology. Below are some web links to programs and services that will help you work DX.

[www.ac6v.com/](http://www.ac6v.com/) - The definitive reference site for ham radio—Over 6000 links.

[www.dxatlas.com/](http://www.dxatlas.com/) - DX Atlas, a great program for DXCC, WAZ, IOTA info plus brilliant Grayline and path headings.

[www.qrz.com](http://www.qrz.com) - The online address and QSLing data base for most hams around the world.

[www.eham.com](http://www.eham.com) - A great source of info on general ham radio

[www.contesting.com](http://www.contesting.com) - Keep up to date with international contests

[www.dx4win.com/](http://www.dx4win.com/) - Excellent logging program.

[www.writelog.com/](http://www.writelog.com/) - Excellent contest logging program.

<http://n1mm.hamdocs.com/tiki-index.php> - This is a free contest logging programme but has most of the functions required for Dxing and used by many hams in NZ. It will send CW, digital and pre-recorded SSB, log your contacts, and even suggest a probable call-sign when you enter part of a call. The spotting function is mentioned below.

[www.kc4elo.com/index.html](http://www.kc4elo.com/index.html)

- Free but very good logging program.

[www.eqf-software.com](http://www.eqf-software.com) -Some great logging programs.

[www.qsl.net/w6elprop/](http://www.qsl.net/w6elprop/) - Propagation prediction (and it's free!).

[www.rchalmers.users.ch](http://www.rchalmers.users.ch) - DX Cluster program (and it's free!).

<[www.yahoo.com](http://www.yahoo.com)> Subscribe to the KiwiDX List Newsgroup You will be in touch with other keen DXers around New Zealand.

<[www.cq-amateur-radio.com/awards.html](http://www.cq-amateur-radio.com/awards.html)> The CQ Magazine awards and contest website.

[www.arrl.org/awards/dxcc/](http://www.arrl.org/awards/dxcc/) The ARRL DXCC awards and contest website.

[www.dxawards.com/book.html](http://www.dxawards.com/book.html) - The K1BV Awards directory listing for 3227 awards.

[www.oh2aq.kolumbus.com/dxs/](http://www.oh2aq.kolumbus.com/dxs/) - The DX Summit—Live DX cluster spots 24 hours a day.

[www.ac6v.com/morseaids.htm](http://www.ac6v.com/morseaids.htm)—The definitive web page on Morse code - worth going to even if you don't understand it or use it!

### Band Spots

Over the last few years the spotting of rare and not so rare dx has become common place. Visit <http://www.dxsummit.fi/DxSpots.aspx> to see it running. Many logging programmes can be linked to this type of site, operators can spot the rare Dx with the click of a mouse. Similarly the logging programme can automatically download spots off the web which then appear on your bandmap - this is a window showing where all spots are on the band you are currently operating. It is considered bad form to spot your own station.

### Minimum-maximum Station gear

There are some facts to consider when you are thinking about investing in equipment for your station.

1 The Operator on the other end can't tell whether you have the latest all singing, all dancing multi featured transceiver costing in excess of \$8K or a 30 year old valve radio you picked up at a junk sale for \$300. 100W is 100W. Both are equal. The only difference is that the older radio may not

have all the latest modern features.

- 2 The stations with the 30m towers and stacked 5-el monobanders driven by very large amplifiers will often beat you in a pileup. These are the guys that work the rare DX first and they love doing it. After they have done it ... they go away and let the rest of us work the station. As long as you are aware of the big guns, it's not a problem because time will be kind to you.
- 3 The stations that have the "best" sounding audio will always win in a pileup. It is human nature that the DX station will always take the path of least resistance and work the station he can understand and clearly hear the easiest. Best means clean, punchy and standing out from the rest. Commercial broadcast announcers are picked because of their mellow authoritative voices. Be aware of your own limitations and strive for the best audio you can generate. An authoritative voice helps!
- 4 With CW-You will need an electronic keyer or computer keyboard keying and clean keying set a bit below the pack's general speed. This is better than trying to impress the DX station that your electronic keyer can do 45 wpm with ease. He can't! - Well, actually some DX ops can but they are rare.
- 5 At the end of the day everything helps, but don't get hung up on particular antennas or brands of radio equipment. They are only part of the picture. A good antenna is the second best investment you will ever make. The first is taking the time to learn the techniques and skills of how a rare DX station thinks and operates. A cunning operator will outwit a big antenna every time!

### Computer logging

Computer logging programs are almost essential for those who have a large number of QSOs. Over time they become one of the best tools around for keeping things in order. Don't start out with a cheap shareware logging program. A key factor in a logging

program is to be able to display various award details in DXCC entity order as one has them worked or confirmed. The main prestige awards are DXCC, WAZ, DXCC Challenge, WAS, WAC, IOTA There are thousands of others. When you want to see how your goals are being met, you can look at your statistics right on the computer screen. Computer logging programs are a great time saver because most of them generate data and address labels that will save hours and hours of handwriting. Computer logging can keep track of QSLs sent and received with just a click of the mouse. A really good computer logging program will do all of the above and control your radio, send CW, display your local packet cluster DX spots and print the QSO information directly onto your QSL cards with no labels involved.

**Logbook of the World**  
<http://www.arrl.org/logbook-of-the-world>  
This web site hosts QSOs from over 50,000 of the most active hams. Upload your contacts and if one of your QSOs has a match with another operator's upload, your QSL is confirmed, no paperwork required.

**The process of QSLing**  
If a newcomer to DXing starts out by working DX stations during contests he will quickly learn that he will work key countries multiple times. I would make the

bureau one of my first choices The QSL Buro Service here in New Zealand is excellent and it will save you postage costs. If you use the NZ Buro a lot make a donation every now and then! My best advice is to save your postage dollars and greenstamps (One US Dollar) for your rare station direct QSL requests. Most DX stations will give QSL detail on their website – or [www.qrz.com](http://www.qrz.com). Send them an IRC or at least US\$2 for return postage Confirming DXCC takes time and by the time one gets close to 100 different confirmed countries, several months or years will pass. There are several systems of filing, and the one that is probably the most common is to keep QSLs in order by DXCC entity. Shoeboxes help and they are inexpensive. There are some neat boxes sold buy the big chain stores here in New Zealand to file photographs in and they are excellent for QSLs. Keeping QSLs in DXCC entity order is the first step in being able to find and sort cards for awards later down the line. Believe me, it is not an easy task to sort a couple of thousand QSLs from scratch. Be smart and start sorting at the very beginning.

**Awards and rewards**  
**The ARRL DXCC Program**  
ARRL DXCC Honour Roll, 5 Band DXCC, WAS, 5BWAS, the DXCC Challenge Award and the CQ WAZ awards are the most prestigious awards in ham radio.

Actually, there are over 3200 awards available to wallpaper your shack. Only the above few really measure how well you compete with other DXers around the rest of the world. In fact the list of awards that can be earned for working certain collections of DX stations is almost endless. [www.ac6v.com/](http://www.ac6v.com/) will give you a link to the universal awards page. We have some world class DXers in New Zealand but only a few ZLs have managed to achieve the ARRL DXCC Honour Roll award. We now have an authorized ARRL DXCC Card checker in New Zealand which means you do not have to send your precious cards to the USA for verification. Contact Lee ZL2AL [leejen@paradise.net.nz](mailto:leejen@paradise.net.nz) for further information. Your DXCC QSOs may also be verified online on the ARRLs website LoTW (Logbook of the World) DXpeditions  
If DXing is an obsession, then DXpeditioners are the lunatic fringe of the DX world. At any given time these are hundreds of amateurs operating from rare locations around the world. You can be assured that there are thousands of others actively planning a DXpedition somewhere and hundreds of thousands of “armchair DXpeditioners” who would love to go. Planning a major Dxpediton is almost as complicated as a NASA mission. Large scale modern DXpeditions can chew through \$500,000 or more in no time so it isn't a project

that can be taken on lightly. New Zealand just happens to have ten or more of some the rarest DXCC entities islands within its territory. ZL7–Chatham Island, ZL8–Raoul Island and ZL9–Campbell and Auckland Islands are usually in the top 25 most wanted entities. The demand continues unabated and opportunity abounds for ZLs to organize more trips to these desired locations. It is the experience of a lifetime to participate as an operator on a DXpedition. The camaraderie and experience gained is incomparable. DXpeditions to ZL7 are easily organized, tremendous fun and are to be recommended for gaining experience. When you consider all these factors, it is no wonder that DXing is so popular even though we are at the bottom of the eleven year solar cycle in 2009 there are always rare DX stations around to be worked. As the propagation becomes better over the next few years HF DX will improve. I am trying to provide tips and information in this section to help you succeed in DXing, whether you are a newcomer 10 DX or a DXing veteran. If you would like to find out more about DXing, contact me at [leejen@paradise.net.nz](mailto:leejen@paradise.net.nz) and I will be happy to put you in touch with DXers in your area. The worst day DXing sure beats the best day working!

73, *Lee Jennings ZL2AL*

ZL DXCC

Reproduced courtesy Duncan McMahon ZL3JT

Call	Mix	Ph	CW	DAT	5BDX	160	80	40	30	20	17	15	12	10	6	2	De Soto
ZLIAA	129																
ZLIAR		116															
ZLIACZ	141																
ZLIAH	362																
ZLIALD	103																
ZLIALE **		349															
ZLIAMN **		350															
ZLIANF	144																
ZLIANH	326	313	173					118		304		146					
ZLIANJ		301					103	115		267		237		213			
ZLIARY	369	364															



Call	Mix	Ph	CW	DAT	5BDX	160	80	40	30	20	17	15	12	10	6	2	De Soto
ZL1AYZ		174															
ZL1BDQ	321				Yes		#	#		#		#		#			
ZL1BIV	193	141															
ZL1BJN		109															
ZL1BKX		340															
ZL1BLV			103														
ZL1BOQ		341			Yes		#	#		#		#		#			
ZL1BWK	321	321															
ZL1BYA	101																
ZL1BYZ **	306	267	296	207	Yes		102	199	203	272	256	221	190	167			1641
ZL1BZT			105														
ZL1CYK	119																
ZL1HY	346	346			Yes		#	#		#		#		#			
ZL1IE	102																
ZL1KEN		106															
ZL1KJ		251															
ZL1NI	107																
ZL1OK	250																
ZL1OGX		103															
ZL1SZ		313															
ZL1WG		337					119	161							156		
ZL2AFT **		354			Yes		#	#		#		#		#			
ZL2AGY	#		#		Yes		#	#		#		#		#			
ZL2AJV		109															
ZL2AKI				149													
ZL2AH	310																
ZL2AL	342	330	319		Yes		209	204	162	315	105	210	119	142			1767
ZL2AMI				100													
ZL2AO	301	300								246	173	151		120			
ZL2AOH	112		101														
ZL2AYZ	144	174		107													
ZL2BB			105														
ZL2BLC		323															
ZL2BNI		105															
ZL2BRB			261														
ZL2BRQ	204	193															
ZL2BRS		329															
ZL2CC	202	198															
ZL2CV	100																
ZL2GEO			104														
ZL2IFB	277	184	273	147	Yes?		139	222	197	227	166	201	120	151			1425
ZL2JJ			235														
ZL2JKP	100																
ZL2JON	182	108	111	126													
ZL2KA			100														
ZL2LW	257	256								183	148	120					
ZL2MM		115															
ZL2NBK		104															
ZL2RR		350	186														
ZL2RVW	200																
ZL2ST	350	334															
ZL2UO	213																
ZL2US	117	105															
ZL2UW	#	#			Yes		#	#		#		#		#			
ZL2VS	341																
ZL3AB	182																
ZL3CED	101																

ZL3DW	124	110								105						
ZL3GA	274	209	158													
ZL3GS	362	362														
ZL3IX						151										
ZL3JT	345	344	338	295	Yes		157	255	247	344	259	324	171	266		2088
ZL3JU	344	339					100	153		336		115				
ZL3NB	173		161					100								
ZL3NW	108	125				108		116								
ZL3PAH	183		165					166								
ZL3REX	275								116		120		113			1082
ZL3TE	218	147	198	129			151		177		134		101			
ZL3TY	152					VHF only 2m and 6m								#	102	
ZL4AS	314	300	251	130	Yes		#	#	163	#	177	#	102	#		1453
ZL4CR	160		125													
ZL4NR		107														
ZL4PN		218														
ZL4PW	293	241	264				125	197	179	275	199	146				1230
ZL4QJ		333						153		178		118				
ZL4SA		113														
ZL0AKH	109															

Number in shaded indicates current Honour Roll, but totals include “deleted entities”

# indicates total not promulgated in DXCC lists

E&OE and silent keys not listed where known

Call signs and totals in bold indicate “Top of the Honour Roll” credited.

\*\* indicates Hall of Fame inductees

## EMC – Electro Magnetic Compatibility

by Bob Vernall ZL2CA  
With updates by Brian Emmett ZL3BE

EMC (ElectroMagnetic Compatibility) may sound as if it is a new topic, but it has been around ever since electrical applications were first developed. Radio and electronic applications need to take account of how one application could interact with another, and consider limits so that all applications could co-exist. In the case of amateur radio, the possible impacts of operating a transmitter are the most obvious situation to consider for compatibility, as the intended radio transmission will have high signal level at the antenna, and decaying in strength in radial directions. EMC can be regarded as having two parts:

- **EMI, ElectroMagnetic Interference**, where disturbance results from an

emission, which could be from non-radio equipment such as a computer.

- **EMS, ElectroMagnetic Susceptibility**, where exposure to an intended radio transmission gives degraded performance to victim equipment such as an audio amplifier.

Should EMC problems arise then there is usually some sort of trade-off to consider by affected parties:

- Is the problem due to a transmission deficiency?
- Is the problem due to susceptibility (even with a “clean” radio emission)?
- What are the choices to solve the EMC problem?
- What are the costs of EMC treatment?

There should be very few, if any, circumstances where an amateur operator is forced to cease operation solely because of EMC difficulties. The end objective of clearing EMC problems should be to develop a practical result that is acceptable to all affected parties. There are advantages for amateur operators who are conversant with EMC causes and cures, as they can put their knowledge into practice should an EMC problem crop up with their station, or help others.

**Some Basic Physical Factors for Electric and Magnetic Fields**

EMC is fundamentally to do with electric or magnetic energy interactions. It is generally desirable to keep one circuit

sensibly isolated from another, but sometimes coupling may arise in unforeseen ways. Coupling could be by any or all of the basic mechanisms, namely:

- Conduction by electron currents flowing in physical conductors
- Induction by electric or magnetic flux linkages (reactive energy)
- Radiation by way of outgoing electro-magnetic fields (radiated energy)

Radiation is of course what communication by radio is all about. The EMC challenge is to carry out amateur radio activities with minimal unwanted interaction with other equipment or services.

In the vicinity of a transmitting antenna there are magnetic



and electric energy fields that are a complex combination of reactive (stored) and radiated (net outgoing) components. The specific reactive and radiated components depend on the type of antenna (different for monopole, dipole or loop). The strength of the near field falls away quite rapidly with increasing separation from an antenna (that is transmitting). **Increasing the separation distance is always a winner for reducing EMC problems.** Even with EMC problems inside the shack, like one piece of equipment placed adjacent to another, a modest shift can have a large impact. When it comes to suppressing unwanted signals, it is usually best to work on finding the root cause and trying to stop the unwanted signal from travelling away from the source. While prevention is better than cure, if the unwanted signal can not be prevented from developing then the next strategy is to minimise the ways in which it may spread. EMC countermeasures include the following techniques:

- Shielding (solid metal, even double screening)
- Bypassing (usually a suitable capacitor with low series resistance)
- Filtering (suitable series and shunt components)
- Suppression (usually within the equipment itself)

Note that many types of plastic equipment cases are transparent to RF and have useless shielding properties at the frequencies involved.

### Filter applications

Filters are one of the basic electronic building blocks that can make the difference between communications being satisfactory or unsatisfactory. There are many types of filter, designed for many applications and for many source or load impedances. Refer to a radio handbook for details on filters. Proper use of filters is central to solving EMC problems.

A low pass filter in the antenna feeder can be a useful accessory for an amateur station, to give a confidence to operating and control of harmonics. When harmonics fall in television bands, the level should be low enough that the air path to a neighbour's receiving antenna has sufficient loss to not result in interference.

Be wary of the specifications of cutoff frequency for low pass filters made for HF operation. In Europe and the USA the lowest band edge for television is 54 MHz. In New Zealand television

channel 1 has a lower band edge of 44 MHz. So a low pass filter designed to protect 54 MHz is going to be short of filtering at 44 MHz. It so happens that some USA manufactured low pass filters are designed to also cater for IF breakthrough for USA television receivers, so are designed to have good rejection upwards from 41 MHz, so these types of low pass filter are best for control of amateur band harmonics falling in New Zealand television channel 1.

Band pass filters can be useful for some amateur situations, such as for reducing strong non-amateur signals from getting into and overloading amateur receiver front ends. Field days or contests with multi-transmitter multi-band operation are examples where extra RF filtering is very useful. Television receivers may have inadequate rejection of amateur HF frequencies. A useful countermeasure is to insert a high pass filter in the feeder to the television receiver.

The current trend with terrestrial television broadcasting is migration to digital modulation and only in the UHF band. This scenario is generally "easier" for amateur radio compatibility than is the case for analogue television receiving in VHF bands. Satellite television broadcasting involves receiving with very directional antennas and take-off angle well above the horizon, so is relatively immune from amateur radio operations.

### Antenna Considerations

Antennas are the key to achieving overall effective performance of an amateur station. For nearly all types of antenna, the radiation efficiency and general effectiveness improve with antenna height above ground-level. The following factors can apply to high antennas:

- DX performance is usually better, on any band
- For receiving, gives some separation from local sources of QRM
- For transmitting, gives less exposure to ground level equipment or people
- Can run lower transmitter power and still sustain communications.

Ground-mounted vertical antennas have a reputation for having near fields (within a wavelength or so) that are "hotter" than those for other types of antennas. In a suburban situation, ground-mounted verticals have maximum radiation directly into nearby houses. The converse of what happens on transmit is that when on receive these ground-mounted verticals can easily

receive neighbourhood QRM. While verticals can be effective for communication on the lower bands, they are unfortunately also potential candidates for EMC problems in built-up areas. Best communication efficiency may be obtained by transmitting on the vertical and receiving on whatever antenna gives the best signal to QRM ratio of the desired amateur signal (the reciprocity theorem applies to wanted RF signals on the path, but practical communication also depends on levels of local QRM and that can be different for each station).

Horizontal centre-fed dipole antennas are inherently much more balanced in operation than ground mounted verticals. Dipoles have surrounding flux patterns that are similar in shape each side of the centre feedpoint. The actual balance of the near field of a dipole depends on the angle from which the dipole is "viewed". A dipole viewed "side-on" presents good balance but viewed "end-on" the near side of the dipole predominates over the far side. On transmit there are unavoidable high voltages (and high field strengths) around the dipole ends. This is also the case for any antenna with an "open end".

Loop antennas are inherently one of the most balanced of all antennas. Much of the near field flux is contained within the loop. A loop antenna has a more confined near field pattern than is the case with dipoles, so tends to do better for receiving in a QRM limited situation. Loop antennas are widely reported as being quieter on receive than other types of antennas, yet are still effective for weak signal reception. Similarly transmitting with a loop has more confined near field. A one wavelength circumference loop can also work on near multiples of wavelengths, and with a tuning unit it can be useful on most bands. A smaller sized frame loop antenna can be useful for reception, when sited in a low noise location and with orientation to make use of the nulls broadside to the frame to get best signal to QRM ratio.

Antennas can develop corrosion in connections, or fatigue breaks in some strands of a multistrand wire. A bad connection or intermittent touching in a fatigued wire not only impairs performance on receive, but can cause arcing when transmitting. Arcing generally results in broad band "click" interference and is obviously an undesirable situation. Even the best filtered transmitter in the country can cause EMC problems if there are bad connections in the antenna.

Well-constructed and well-maintained antennas generally give least EMC problems. As always, antennas should be mounted "in the clear" for best communication results and least invitation for EMC problems where RF power couples into surrounding structures.

Transmitting antennas and feeders should be kept away from television antennas or downloads as otherwise it invites large levels of amateur band signals arriving at the television receiver front end. Reciprocally, and QRM from the television signal could couple to the amateur feeder.

### Desirability of using a balun with a balanced type of antenna

Even if a balanced type of antenna is selected for use, the actual balance of the overall antenna system depends on how the feeder is connected. If the feeder is coaxial cable then using a **balun** (balanced to unbalanced transformer) at the antenna feedpoint is one way of minimising RF current from flowing back down the outer of the coaxial cable rather than into the antenna proper. As well, a balun can minimise noise from travelling up the outer of the coaxial cable and making reception seem worse than it would be without the unwanted noise. Another technique for reducing the affect of the coaxial cable braid is to use an RF choke, typically by having a string of well-fitting ferrite toroids over the feeder. For making your own balun or choke, refer to an appropriate handbook for selection of core types.

### Active Antennas

An active antenna can be useful for receiving, especially when there is local QRM. Active antennas can be physically very small in wavelength terms. Small size has a smaller near field zone. While a transmitting antenna usually has "full size" dimensions for radiation efficiency reasons, when used for receiving the larger size may be worse for pickup of local QRM. The main criteria for an effective active receiving antenna are that the delivered result has atmospheric noise (QRN) dominating over thermal noise (noise from the active antenna electronic devices). It is possible for a one metre whip with JFET input stage to be an effective active antenna over many bands, particularly lower bands where QRM can limit sensitivity. Siting the active antenna away from houses and power lines can often deliver a better signal to noise ratio of



a wanted radio signal than for reception using a "transmitting" antenna.

An active antenna can be broadband. Frame loops can also be used as active antennas, but usually need to be tuned. A fairly long feeder is possible as the headend can incorporate enough active gain to compensate for some line loss. A multiwire cable is needed if power supply, tuning voltages and band switching control all need to be fed from the shack. If the power supply is mains powered, it needs to be carefully designed to resist breakthrough of mains-born noise. Obviously the active antenna electronics need to be designed for good linearity (low intermodulation) and survival from exposure to high signals (on-site transmission from another antenna). Great care should be taken with feeder connection so as to not inadvertently transmit into an active antenna; as such an experience usually renders it inactive until repaired. Transceivers with separately accessible receive only input are ideal for connecting to an active antenna, and not exposing receive only equipment to risk of a "bite" by inadvertent connection to a transmitter output.

### Commercially Manufactured Transceivers

These days there are a great many commercially manufactured transceivers used by amateur radio operators. While it is a shame that home construction is less popular than in yesteryear, it should not be overlooked that the commercial "appliances" bring with them a reasonably high standard of performance in terms of suppression of harmonics and other types of unwanted emissions. Nearly all commercial transceivers include a good modulating stage, good signal filtering and a reasonably designed power output stage. In some countries there are regulatory requirements for limiting unwanted emissions, so commercial transceivers need to be designed for sufficient suppression of unwanted emissions if they are to qualify for marketing in those countries. The general result is that "big name" manufacturers tend to have good pedigree for EMC, as they seek international sales potential for their products.

### Power supply considerations

The humble power supply should not be overlooked as a possible EMC situation. For example, on-site hum modulation can occur when RF gets into rectifier diodes.

The resulting hum modulated signal then escapes by the reverse path of how it entered the power supply. Regulated power supply action may malfunction should RF be conducted into the circuit via AC or DC power leads. General treatment for HF EMC problems is to use 0.01  $\mu$ F disc ceramic capacitors to "bypass" all leads and semiconductors, but of course they should be checked for not slowing down the response of electronic voltage regulators being able to follow variations in current drawn from the supply. VHF EMC problems should be treated with lower value "bypass" capacitors, or even metal shields. Do not skimp on safety ratings with capacitors used on mains leads (if a capacitor is not marked as being 230 volts AC mains rated, then do not use it on mains wiring). Winding AC or DC leads on ferrite toroids can also be effective at reducing RF getting into a power supply or into equipment connected to the power supply.

Hum loops can be a problem when several separate pieces of equipment are connected up, as the grounded conductors in connecting leads provide a mesh of paths in which earth return current is able to flow. Power supply currents sharing conductors with low level audio signals is a recipe for coupling unwanted hum and noise to the audio feed. A very effective way of controlling power supply hum loops is by using **split bobbin** power transformers and two wire mains leads. A split bobbin transformer with a double insulated rating is legally able to be used with no earth wire, thus a potential hum loop via the mains earth is entirely avoided. For safety reasons this is **not** a technique to try with other than the proper rated split bobbin type of transformer. An isolation transformer in series with an existing power cord can be used with equipment that does not have a split bobbin transformer in its power supply, or as a way of testing where a hum loop arises. Isolation transformers have highest isolation at lower frequencies, and are limited by primary to secondary coupling capacitance in restraining higher frequencies from "jumping" the windings.

Switch mode power supplies may give high efficiencies and small package size, but there are inevitably "hash problems" for switching related QRM over several bands. One innovation in a commercial switch mode power supply for radio gear is to have a front panel "tuning knob" so the switching rate can be optimised

for minimal interference falling on a given working frequency (and needs re-adjusting as appropriate). Having a tuning knob does nothing to reduce the generation of hash or harmonics but instead arranges for them to be steered to least harmful spots on the dial.

For "wall wart" supplies (small power supply integrated with the plug) a lightweight one is likely to be switch mode and can generate broadband hash, whereas older types with iron-cored transformers are more likely to be neutral from an RF point of view. If swapping of a switch mode for iron-cored "wall wart" is contemplated, bear in mind that regulated output may be needed, and that most iron-cored wall warts have unregulated output.

### Limitations Of Inductors

High frequency inductors are sometimes rated by the manufacturer for operation over a specified frequency range. This is a realistic reflection that unavoidable inter-winding capacitance results in self-resonance at some relatively high frequency, and also for losses in core or coil former material. For frequencies above self-resonance the "inductor" appears to behave more like a capacitor, and explains why some filters may not deliver the expected results at higher frequencies. What is intended on a circuit diagram and what happens to an installed inductor may not achieve the intended result. Inductors need to be carefully selected if wideband performance is sought.

### Limitations Of Capacitors

Capacitors also become self-resonant at some high frequency, when resonance occurs with unavoidable inductance of the leads and body. All lengths of conductor have some inductance, so it is impossible to build a perfect capacitor that would work at any frequency. However, capacitors are generally useful over a much wider frequency range than is the case for inductors. Disc ceramic capacitors are generally the best all round performers for HF and VHF work. Surface mount capacitors have the shortest possible leads, but performance still needs to account for printed circuit track length. The rated upper frequency range of mains bypass capacitors is sometimes no more than a few megahertz. Polystyrene or polypropylene capacitors are generally the lowest loss type of capacitor in the audio and lower frequency bands.

### Ferrite and Powdered Iron Components

There are many types of ferrite and powdered iron cores, and care is needed to select an appropriate type for a given application. There is quite a difference between selecting a core for a low loss RF transformer and using a core to attenuate unwanted RF signals. Transformer cores working at signal frequencies generally require selection of a given type of core material that has low loss in the frequency bands of interest, especially where RF power is involved (a lossy core will soon be "cooked" and could have permanent deterioration of core parameters). For EMC applications ferrite material is generally selected for loss at frequencies that are much higher than for those when it would alternatively be used as a transformer core. Low Q absorptive mode of operation usually gives best EMC performance than reactive choking (reflects rather than absorbs QRM). A low Q choke is like having an inductively coupled series resistor in the circuit.

Split-core ferrites can easily be fitted over existing wiring, and can effectively add a series impedance to higher frequency signals in the wiring. Split-core ferrites are widely used commercially, for the likes of reducing radiated noise from computer cables (especially in the VHF broadcast bands). The split core (when fitted properly over a wire or cable) is equivalent to a one turn inductor with a toroid core, so not unexpectedly has fairly low impedance at lower frequencies, so does little to reduce conducted noise that happens to fall in the 160 or 80 metre amateur bands. Several turns on a high permeability core are needed for there to be useful attenuation in the MF and lower HF bands. Low band chokes can be made from U or E cores salvaged from scrapped switch mode power supplies. Highest choking is obtained with no shims and no air gap for U or E core mating faces.

Powdered iron cores have less permeability than ferrite but are generally superior for linear performance at transmitter output power level. Powdered iron cores are widely used for inductors in transmitter output filters, and most of these are in toroid (ring) form. Toroid cores are ideal for keeping most of the magnetic flux within a closed path (around the toroid) which not only leads to fewer turns for a required value of inductance but also minimises the flux that possibly links with other circuits.



Cores need to be selected for frequency range and whether it is for transmission or suppression. For transmission applications, core size needs to be selected for power handling (with operation well away from saturation limits).

### Telephones

Older technology telephones have passive components and have good immunity to RF exposure. Newer types of electronic telephone have ICs and semiconductor junctions that can demodulate even moderate levels of RF. It is difficult to offer useful EMC advice on selections of telephones for private ownership, as there are so many types of telephones in use, with new ones appearing, and marketing for low cost likely cuts corners in the specific area of RF immunity. An easy to try solution is a DSL filter inserted inline with the telephone that suffers RF interference. DSL filters are designed to separate off voice baseband by low pass filtering, and this can be useful for reducing RF pickup even if there is no DSL service on a given line (it does not matter if the DSL output socket is unoccupied, the low pass part of the filter can be used for non-DSL applications like keeping RF out of any telephone).

### Controlling RF Pickup In Audio Amplifiers

The input stages of audio amplifiers can act as crystal sets

and detect RF that happens to arrive with good level at the input device. The detected parts of the RF envelope that are in the audio range can thus be amplified by subsequent audio stages. A useful way of reducing RF arriving at the first audio stage is to use an RC low pass filter (a series resistor followed by a parallel capacitor to equipment chassis or PCB earth). A resistor of a few hundred ohms (but could be as much as 10% of the amplifier input resistance) and a capacitor of a few hundred picofarads (but with a reactance that does not significantly reduce the level of the highest audio frequencies) can be very effective at controlling RF breakthrough. A suitable value series resistor is considered to be a more consistent performer than an RF choke (RFC). This is because the resistor retains its effectiveness over a very wide bandwidth, whereas the RFC may offer too little reactance to be effective at lower frequencies and become self-resonant below the desired upper frequency limit of operation. Speaker leads also act as unintended aeri-als. RF pickup in the amplifier can be reduced by winding the speaker leads on a ferrite rod or ferrite toroid (this of course uses up some of the length of the speaker lead).

### Computers and amateur radio

Many amateur operators use a computer in the shack. The computer motherboard involves

a myriad of high speed digital signals for clocking and data processing, so there is usually very high potential for interference to be experienced by a nearby radio receiver. The power cord, keyboard cable, printer cable, mouse cable, monitor cable and COM or USB cables are also possible ways that "computer hash" can escape. A CRT monitor can produce magnetic deflection fields for quite a distance from the monitor. Wide bandwidth video drive signals may also be noticed on nearby radio receivers. Nearly all computers and monitors use switchmode power supplies, which can also be "hash generators" from a radio perspective. Commercial leads with integral ferrite sleeves are likely optimised to reduce emissions in the VHF broadcast bands, so may have only moderate attenuation for lower amateur bands. Don't take for granted that a ferrite sleeve is good at attenuating QRM at lower bands, and if cords are long enough then better results could be had by winding multiple turns in a high permeability core (like E or U cores, check for no shims). Before purchasing a computer, look for labels indicating FCC or CE compliance with EMC standards. Taming interference within a computer would be beyond the scope of any warranty offered on a computer, and also be a difficult challenge. Having a portable radio with frequency coverage on bands of interest is

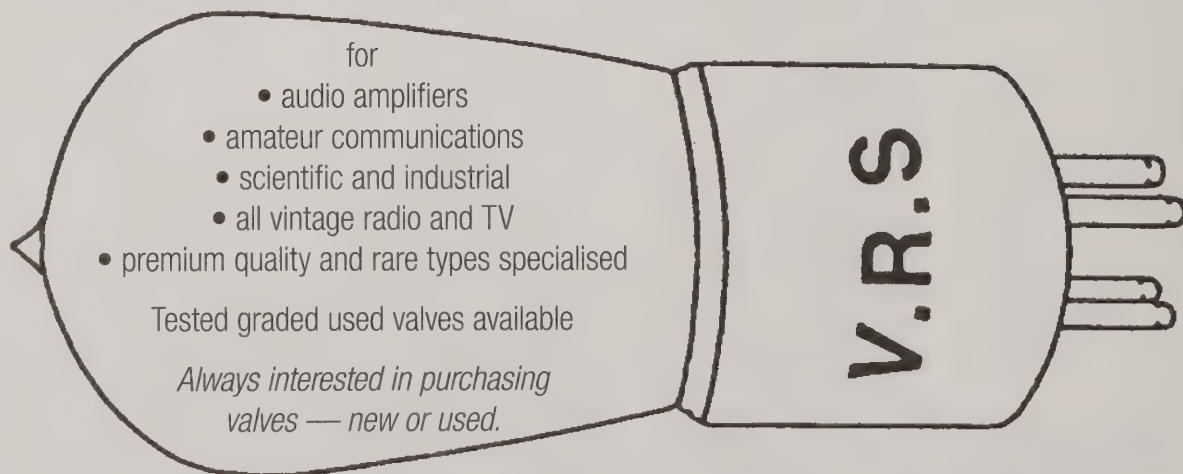
one way of evaluating relative interference in a shop situation. Monitoring with AM mode is much more informative than receiving on any other mode. Having an analogue S meter is useful for comparing levels. Some computers are quite acceptable for running in the shack alongside radio equipment. However, a "bad" computer can be an irritation for amateur radio operation.

Some switched mode power supplies have only token RF filtering and these can be quite bad for causing local interference. Fitting an external mains filter is generally not as effective as having the filtering components inside the power supply. One way of improving on a computer power supply causing QRM is to swap out the power supply module for one that is claimed to have good RF filtering, and is also electrically compatible for socket pinout and voltages (AT, ATX, etc).

For radio data modes such as RTTY, packet, AmTOR or Pactor, it is easy to for mains hum (and related power supply buzz from mains harmonics) to contaminate audio feeds. The solution is to use audio isolation transformers as these are like "braid-breakers" in preventing earth loop paths. Telephone style isolation transformers (can be salvaged from a scrapped dial-up modem) are ideal for using in a radio interface unit, as they have relatively high voltage isolation

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specifications. PTT control can be implemented with a suitable opto-isolator (a cunning way of providing the equivalent of a contact closure). Having a means of adjusting audio level is also handy, as computers can

generate volts of audio drive and microphone inputs can easily be overloaded. A lap top PC can have a very low level of overall radio noise. LCD displays are lower energy than cathode ray tubes, and lap top PCs

generally have compact and well-shielded modular construction. In some cases an external switch mode power supply can be the worst interference generator in a laptop PC setup. An external power supply can be replaced by a

low noise linear regulated power supply with the same DC output. Having the Internet available on a shack PC can be useful, and a WiFi feed is a "wireless workaround" to running data cables and risk of data QRM.

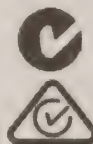
## EMC COMPLIANCE

The majority of the world's countries now have regulations in place to govern the supply of electrical and electronic equipment capable of causing harmful radio interference. In New Zealand the Radio Spectrum Management group (RSM) of the new Ministry of Business, Innovation, and employment is the responsible administrator. However these regulations were developed to protect licensed broadcasting services, commercial radio-communications services, and public safety. They are designed to minimise interference, not to eliminate it; and they are not designed to protect amateur radio communications. The reason is that equipment used in licensed services

must meet very specific performance standards and the licence conditions will specify the expected coverage area where reliable communications can be maintained. While operating within those constraints a service can reasonably expect RSM to protect it from harmful interference. The amateur radio service on the other hand is a service where equipment performance and coverage areas are highly unpredictable and where equipment is generally operating far outside the limits normally imposed on commercial operators. It is not reasonable to expect interference protection under those conditions. There are, however, three scenarios where an amateur

radio operator can request action from RSM although in most instances it is up to the amateur operator to identify the source of the interference. If the source of the interference turns out to be a non-compliant product RSM could be expected to investigate. If the source of the interference is a compliant product but has a fault condition that is causing interference then again RSM can be expected to investigate. If the amateur operator can demonstrate the source is also causing interference to a licensed service such as a broadcasting station then RSM is obliged to investigate. So how does one identify a compliant product? All electrical and electronic

equipment supplied in New Zealand must comply with New Zealand EMC regulations which include a requirement to affix a compliance mark, generally on the product label. In most cases that mark will be the C-Tick although the less common Regulatory Compliance Mark (RCM) may also be used. This will all change from March 2013 when the C-Tick will be phased out and replaced by the RCM. The basic difference is that the C-Tick signifies compliance with radiocommunications and EMC regulations only while the RCM adds electrical safety. C-Tick Mark



Regulatory Compliance Mark (RCM)

## AREC - AMATEUR RADIO EMERGENCY COMMUNICATIONS

### MISSION STATEMENT

*To be the preferred provider of emergency communications to New Zealand Emergency Services.*

The AREC was formed in 1932 following a devastating earthquake in Napier. Today, the AREC consists of 74 Sections throughout New Zealand, each with its own Section Leader who is responsible for the training and conduct of the Section. Each Section is attached to a Branch or Branches of NZART, from where members are drawn. Management of the AREC is vested in a National Director who is appointed by NZART Council. The National Director likewise appoints a Deputy, Secretary, Training Officer and Managers for the four districts. These eight people form the AREC Management Group. The current objectives are:

- To train and provide communications personnel, skilled in assisting organisations

during emergencies.

- Maintain a close liaison with the New Zealand Police for Search and Rescue.
- Maintain a close liaison with Civil Defence.
- Maintain a liaison with community organizations.
- Provide and maintain equipment appropriate for emergency operations.

National Director AREC controls the issue of AREC Station Identifiers, formally known as "E" call-signs. AREC Sections are listed in this publication, in identifier order, along with their Section Leaders and Deputies. The Section Identifier, in its basic two letter form, is issued to the Sections' Leaders for their use only. AREC Station Identifiers for Section use are then issued by the Section Leader for that operation/

exercise, with the following being normally reserved:

- "A" = Section Base Station
- "X" = Established Relay Stations
- "Z" = District Control Stations

AREC operators engaged in SAR activities and operating on SAR frequencies are to use the call-sign allocated for that operation/exercise. This call-sign is to reflect the geographical location (nearest town) of the search area. Civil Defence's radio call-signs are controlled by the CD organization.

### AREC emergency frequencies

The following frequencies are reserved for AREC use in emergencies:

- 1875-1900 kHz
- 3550 and 3900 kHz
- 7100 kHz
- 2 m and 70 cm repeaters

The general calling frequencies for AREC stations requiring assistance in emergencies are, 3900 kHz USB or local repeaters and these frequencies are normally monitored by AREC personnel during events such as storms, earthquakes and other significant events that could give rise to emergencies.

### AREC Sections' Net

A monthly net is held on 3900 kHz USB at 1930 hours NZST or at 2030 hours NZDT on the third Monday of each month except December. This net uses the AREC Identifier of **ZK6E**, the AREC master station and is conducted as a contact net for those Sections wishing to seek information or report activities of an AREC nature.

## Be prepared for an emergency - what to do - suggestions

As an Amateur Radio Operator, who may become involved with an emergency of some kind and having access to assistance

via radio could provide timely intervention to those in distress. Preparations for such an eventuality would be good

planning and the following suggestions are offered.

- 1 Be familiar with your local repeater services and

frequencies, with a knowledge of the service area.

- 2 In the event of an SAR requirement, contact your



nearest Police station, they will activate their system.

- 3 For Civil Defence requirements, contact either your Regional or District Councils.
- 4 Be familiar with your AREC representatives or Club officials, keep a list in the house and car.
- 5 Use the AREC call frequencies or break-in on any net and identify yourself and the emergency at hand.

When making a call for assistance, by radio, ensure that all the vital details concerning the emergency are passed to the station that is contact the emergency services, this will enable a more appropriate response.

### Police, Fire, Ambulance check list

#### Type of incident

Road accident—type and number of vehicles involved.

—Number and extent of injured or trapped persons.

Type of medical emergency—heart attack, electrocution, etc.

What is on fire—car, building, stove, etc.

Kind of accident—car/truck, car/person, motorcyclist etc.

Hazardous chemicals involved—gases, liquids, fuel, etc.

#### Location of accident

Street or road name and number, rural number, highway number. Cross street or road reference. Suburb and city or town.

Any other geographical detail to clarify location.

#### Other information

Vehicle registration number—burglar, hit and run, etc.

Description of people—clothing, height, race.

Direction of travel.

(If you are making a telephone call to the emergency services, make sure the above information is gained from the person on the radio before making the 111 call.)

#### Marine distress call

Intercepting a “MAYDAY” call, briefly listen to see if any other station is responding, then endeavour to contact the distressed vessel on the frequency and mode they are using. Do not get them to change frequency. Ask for details of the distress and write down the details given.

#### Essential information

**Where** Position, latitude and longitude, GPS information, any bearing and distance from geographical feature or place.

**What** What is the nature of the distress?

What help is required?

What battery life or restrictions are on radio use?

What lifesaving equipment is on the vessel?

Has an EPIRB been activated?

What is the weather at the distress position?

#### Who

Description of distressed vessel, name, registration and size.

How many people in distress and their ages.

Colour of vessel and distinguishing marks.

Also record the time and frequency of the distress call. If practical get another person to telephone in the information and stay on the frequency to gather other essential information. Tell the operator what assistance you are giving to help them.

#### Desirable information

##### Voyage details

Departed time, date, destination. Last known exact fix, if position unsure.

##### Medical details

Any specific medical needs or conditions?

Extent of injuries.

##### Safety equipment

Food and water available.

Other types of radio equipment, VHF, HF.

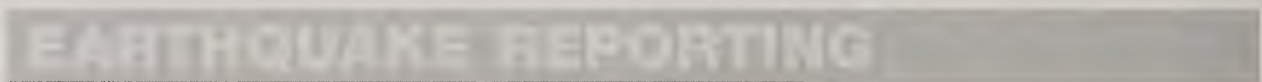
Flares and types available.

The station called Mayday, in fact, might not hear you calling because of propagation or other factors, but continue to listen, they could transmit their position details blindly. Regardless, report the distress call to the coast guard or Taupo Marine Radio stating the time and frequency, when first heard and any other details of the signal, background noises or how genuine it sounds.

#### Earthquake

In the event of a moderate or greater earthquake felt in your location, your assistance, through AREC, could be valuable to Civil Defence. Switch to your local VHF repeater and monitor for activity about the event. An AREC station may be requesting reports from stations on what has occurred in their locality. AREC will be gathering this information to put together a “Felt Report” (refer to Earthquake Reporting). This information is then relayed to Civil Defence to help them access the extent of damage that may have resulted.

Apart from estimating the intensity of the earthquake, any information about the state of the utility services and any other significant details known about your surroundings will be useful.



## THE MODIFIED MERCALLI SCALE OF INTENSITY OF EARTHQUAKES

### Introduction

The severity of an earthquake can be expressed in two terms, namely intensity and magnitude. These two terms are different and are often confused.

Intensity is based on the effects of ground shaking on people, buildings, contents and natural surroundings and varies from place to place within the disturbed region. This observed effect depends on the location of the observer with respect to the earthquake epicentre (location within the earth's crust where the movement occurred).

Magnitude is related to the amount of seismic energy released at the hypocentre (point on the earth's surface directly above the earth movement). This measurement is made by and recorded on instruments (Seismograph) that have a common calibration, thus magnitude is determined instrumentally and uses the Richter Scale to indicate the magnitude. The Richter Scale bears little resemblance to how people perceive the intensity of an earthquake, thus the “Modified Mercalli Scale of Intensity” is measurable by people.

This scale is based on certain key responses being felt or observed by people who can then grade the intensity using this scale, and communicate this to others. When reporting an earthquake you should use this scale to convey the effects that had been felt in your location. When a number of reports are collected from an area and assembled in one place, a summary of this information then becomes known as a Felt Report (indicating the extent of the area it was felt over and what intensities were experienced).

### Modified Mercalli Scale of Intensity

**MM1** Not felt by humans, except in especially favourable circumstances, but birds and animals may be disturbed. Reported mainly from upper floors of buildings more than 10 storeys high. Tree branches, chandeliers, doors and other suspended systems of long natural period may be seen to move slowly. Water in ponds, lakes, reservoirs etc may be set into seiche oscillation.

**MM2** Felt by people at rest indoors, especially by those on upper floors or otherwise favourably placed. The long period effects listed in MM1 may be more noticeable.

**MM3** Felt indoors, but not immediately identified as an earthquake by most. Vibrations may be likened to the passing of a truck. It may be possible to estimate the duration, but not the direction. Hanging objects may swing slightly.

**MM4** Generally noticed indoors, but rarely outdoors. Light sleepers may be awakened. Vibrations may be likened to passing heavy traffic, or to the jolt of a heavy object falling or striking the building. Walls and frame of building are heard to creak. Doors and windows rattle, liquids in open vessels may be slightly disturbed. Standing motor cars may rock, and the shock can be felt by their occupants.

**MM5** Generally felt outside, and by most indoors. Most sleepers awakened. A few people frightened. Direction and motion can be estimated. Small unstable objects may be displaced or upset. Some glasses and crockery may

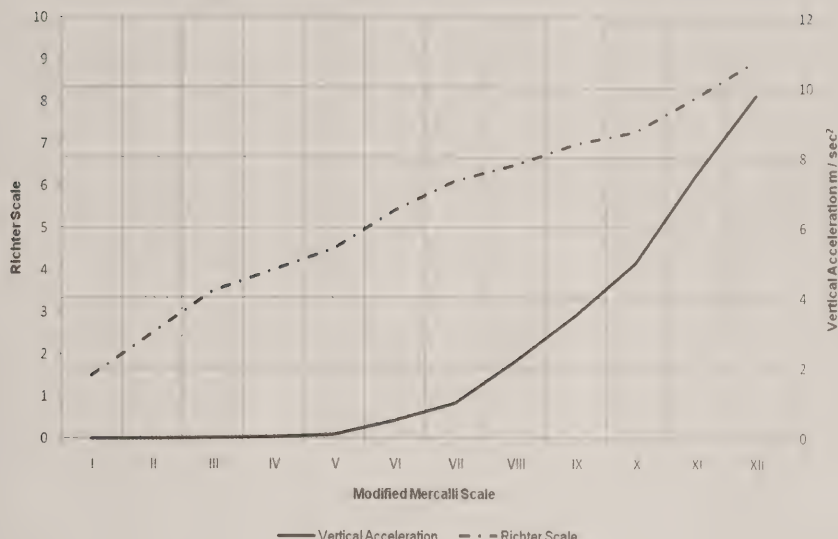
be broken. Some large windows cracked/damaged. Hanging pictures move. Doors and shutters may swing. Pendulum clocks are affected.

**MM6** Felt by all. People and animals alarmed. Many run outside. Difficulty experienced in walking steadily. Slight damage to masonry “D”. Some plaster cracks or falls. Isolated cases of chimney damage. Windows, glassware and crockery broken. Object fall from shelves, pictures from walls. Heavy furniture moved. Unstable furniture overturned. Small church and school bells ring. Trees and bushes shake, or are heard to rustle. Loose material may be dislodged from existing slips, talus slopes or shingle slides.

**MM7** General alarm of people and animals. Difficulty experienced in standing. Noticed by drivers of motorcars. Trees and bushes strongly shaken. Large bells right. Masonry “D” cracked and damaged. A few instances of damage to masonry “C”. Loose brick and tiles dislodged. Unbraced parapets and architectural ornaments may fall. Stone walls cracked,

# Approximate Comparison of Earthquake Intensity Standards Modified Mercalli and Richter Scales

Courtesy www.geography-olts.co.uk



## THE R-S-T SYSTEM

### Readability

- 1—Unreadable.
- 2—Barely readable, some words distinguishable.
- 3—Readable with considerable difficulty.
- 4—Readable with practically no difficulty.
- 5—Perfectly readable.

### Signal Strength

- 1—Faint signals barely perceptible.
- 2—Very weak signals.
- 3—Weak signals.
- 4—Fair signals.
- 5—Fairly good signals.
- 6—Good signals.
- 7—Moderately strong signals.
- 8—Strong signals
- 9—Extremely strong signals.

### Tone

- 1—Harsh, broad hiss, no perceptible tone.
- 2—Harsh, broad hiss, just perceptible tone.
- 3—Harsh, broad non-sinusoidal tone.
- 4—Harsh, broad tone, badly hum-modulated.
- 5—Poor sinewave, badly hum-modulated.
- 6—Good sinewave, pronounced hum modulation.
- 7—Good sinewave, definite hum modulation.
- 8—Excellent sinewave, just perceptible hum modulation.
- 9—Perfect sinewave.

The "tone" scale is used for reporting the amount of hum on a CW signal. If the signal has chirp, the letter "C" can be appended. If the signal has key-clicks, the letter "K" can be appended. Most of the signals you hear will be T9.

weak chimneys broken, usually at the roof line. Domestic water tanks burst. Waves seen on ponds and lakes. Water made turbid by stirred up mud. Small slips, caving in of sand and gravel banks.

**MM8** Alarm may approach panic. Steering of motorcars affected. Masonry "C" damaged with partial collapse. Masonry "B" damaged in some cases. Chimneys, factory stacks, monuments, towers and elevated tanks twisted or collapsed. Panel walls thrown out of frame structure. Some brick veneers damaged. Decayed wooden piles broken. Frame houses not secured to foundations may move. Cracks appear on steep slopes and in wet ground. Landslips in roadside cuttings and unsupported excavations. Some tree branches may be broken off. Changes in the flow or temperature of springs and wells may occur. Small earthquake fountains (fissures).

**MM9** General panic. Masonry "D" destroyed, masonry "C" heavily damaged, sometimes collapsing completely, masonry "B" seriously damaged. Frame structures raked and distorted. Damage to foundations generally.

Frame houses not secured to foundations shifted off. Brick veneers fall and expose frames. Cracking of ground conspicuous. Minor damage to paths and roadways. Sand and mud ejected in elevated areas, with the formation of fissures and sand craters. Underground pipes broken. Serious damage to reservoirs.

**MM10** Widespread panic. Most masonry structures destroyed, together with their foundations. Some well-built buildings and bridges damaged. Dams, dykes and embankments seriously damaged. Railway lines slightly bent. Concrete and asphalt roads and pavements badly cracked or thrown into waves. Large landslides on river banks and steep coats. Sand and mud on beaches and flat land moved horizontally. Large and spectacular sand and mud fissures. Water from rivers, lakes and canals thrown up on banks.

**MM11** Wooden frame structures destroyed. Great damage to railway lines and underground pipes.

**MM12** Damage virtually total. Practically all works of construction destroyed or greatly

damaged. Large rock masses displaced. Line of sight and level distorted. Visual wave motion of the ground surface reported. Objects thrown upward into the air.

### Masonry categories

**"A"** Structures designed to resist lateral forces of about 0.1g that satisfy the New Zealand building code 1955. Typically, well reinforced ferro-concrete. All mortar is in good condition and the design and workmanship is good. Few buildings erected prior to 1955 can be regarded as category A.

**"B"** Reinforced buildings of good workmanship and with sound mortar, but not designed in detail to resist lateral forces.

**"C"** Buildings of ordinary workmanship, with mortar of average quality. No extreme weakness, but neither designed nor reinforced to resist later forces.

**"D"** Buildings of low standards of workmanship, poor mortar or constructed of weak materials like mud brick and rammed earth. Weak horizontally.

## DIGITAL MODES

by Murray Greenman ZL1BPU/ZL1EE

Digital Modes are a facet of the hobby of great interest to some Amateurs, but remain an unexplored and misunderstood world to others, who perhaps expect it to be difficult and expensive to get involved, requiring extensive computer skills, and lacking in interesting live contacts with other Amateurs. This is however not

true at all. Use of Digital Modes, particularly HF Digital Modes, for real-time contacts, has grown tremendously. Some of the modes developed in the last 10 years or so are now extremely popular for working DX, while other modes have advantages when working locals when conditions are poor—no need to suffer those static crashes. With low solar activity

at present, Digital Modes take on a new importance, allowing QSOs to continue despite poor conditions.

VHF and UHF operation is mostly limited to packet operation, typically APRS (Automatic Position Reporting System). Bulletin board and message forwarding by radio has now largely been replaced by the

internet. A new very high speed data and digital voice system called D\*Star is beginning to be explored in some areas. There is also some interest in VHF SSTV, PSK-31, Hellschreiber, specialized Meteor Scatter, Aurora and moon-bounce modes, which offer considerable promise. Influenced by the internet, VHF packet activity has dropped markedly



in recent years, but the HF digital "chat" modes are more popular than ever.

Digital modes make use of some type of keying or modulation to send data as "0"s and "1"s. For example, RTTY uses Frequency Shift Keying (FSK), sending "0"s on one frequency, and "1"s on another, with the elements arranged as five sequential data bits per character along with others for synchronizing the receiver. Morse and Hellschreiber send dots as carrier, and gaps between dots as no carrier. PSK31 sends "0"s and "1"s by switching the carrier phase, which you can imagine is the same as interchanging the leads to the antenna at the data rate. New chat modes such as DominoEX offer a considerable performance enhancement for VHF as well as HF.

Most digital modes use a coding system, which means that the letters and numbers (or even voice sounds or picture colours) are represented by numbers, which are transmitted as "0"s and "1"s. This improves the efficiency, but reduces the resistance to errors. RTTY (which uses the CCITT International Alphabet ITA2), PSK-31 (which uses the G3PLX Varicode), Pactor (which uses ASCII, also known as ITA5) and digital voice (for example DRM, which uses a compression algorithm) are examples of coded modes. FAX, SSTV, and Hellschreiber are examples of uncoded modes.

Many of the newer modes use an error correction system to ensure that the data arrives intact despite problems in the propagation path. This error correction takes one of two forms: Automatic ReQuest repeat (ARQ) or Forward Error Correction (FEC). These techniques have different merits, so some modes use a combination of FEC and ARQ.

ARQ requires a two-directional link, where each "packet" or block of data received is checked for errors and a request for repeat transmitted back if necessary. These modes are characterised by alternate transmissions from each end of the link; they are not suited to broadcast or net operation, and can be difficult to monitor, because you have no opportunity to receive corrections, and may get multiple transmissions when one of the linked stations has data to repeat. Pactor, Digital SSTV, RFSM8000 (Mil Std 188-110B) and VHF Packet use ARQ techniques. Provided conditions are good enough for the link to operate, the data transmitted via ARQ will always be perfectly received-eventually. When conditions are poor, throughput

drops off dramatically.

There are several types of FEC, using a simple systematic repetition, complex mathematical algorithms or massive redundancy. FEC has the advantage that the information required to reconstruct the data accurately is transmitted along with the data, so is available to all receivers, while the data rate is constant, and no repeats are required. This is better for net operation. Some FEC types are extremely robust, but no FEC system can alone provide guaranteed perfect copy. Another disadvantage of FEC is that there is some coding delay at the transmitter, and decoding delay at the receiver; as a result, there can be unacceptable delays before print appears at the receiver. MFSK16, MT63, Olivia, the weak signal mode MEPT\_JT and the new THOR mode are examples of FEC modes.

Uncoded modes do not need or use error correction, as they are generally robust by nature; in other words an error is seen as a blemish, rather than a completely different image, character or sound. These modes rely on powerful human pattern recognition ability for reception. Uncoded modes have an elegant simplicity and are generally characterized by the ability to send "overs" as short as just one character. The classic examples are the uncoded Morse and Hellschreiber, but some coded modes such as DominoEX are also sufficiently robust to not require error correction.

### Digital mode software

Most of the Digital Modes discussed here can be operated with nothing more than a PC with a sound card, with very high performance. The sound card is used to send and receive audio tones which are used with an SSB transceiver. Reference(1) is arguably the best available guide to PC Digital Modes. A Guide to Sound Card Digital Modes with links to the software is also available on the Call Book CD, along with a presentation on HF Digital Modes.(2) The best way to locate the software mentioned in this review is via an Internet search engine, as web sites change frequently.

Other modes, such as Pactor and VHF packet, typically require an external module: either a modem or a modem and controller combination. There are now programs which emulate the modem and controller in software using the sound card.

### Baud, bps and wpm

The symbol rate (baud) of a

digital transmission is the rate in Hz at which the most basic data symbols are switched on the transmitted signal. For example, Amateur RTTY operates at 45.45 baud. The bit rate, in Bits Per Second (bps), is the actual data rate entering or leaving the modem (or sound card emulating a modem). For various reasons (compression, use of multiple carriers etc.) the bit rate may well exceed the baud rate. For example, MT63 has 64 carriers, and achieves 640 bps at only 10 baud.

The text transmission rate or typing speed in Words Per Minute (wpm) depends on how many bits there are per character (there are on average six characters in each English word, including a word space). As examples, 45.45 baud RTTY is 45.45 bps, and since there are 7.5 bits per character, RTTY operates at 6 characters/sec or 60 wpm. PSK-31 operates at 31.25 baud and achieves about 50 wpm. DominoEX11, an MFSK mode, operates at only 10.7666 baud using 18 tones, and yet achieves about 62 wpm. Feld-Hell operates at 122.5 baud, uses up to 49 bits per character, and is capable of about 25 wpm.

The use of FEC also influences the relationship between raw bit rate and typing speed, always slowing the typing speed compared with operating without FEC. This difference is called the FEC rate. To use the previous example, MT63 operates at 640 bps, but achieves only 100 wpm due to heavy FEC with a rate of 0.1.

Techniques which vary the size of each character (for example variable sized codes, "varicodes", or proportional fonts) can speed up the text speed for a given baud rate, and the actual speed then depends on context, just as it does in speech.

### Bandwidth and speed efficiency

It is important to realize that some modes use much more bandwidth than others, often (but not always) in order to provide some other advantage. For example, compare PSK31 (bandwidth 50 Hz, speed 50 wpm) with MT63-500 (bandwidth 500 Hz, speed 50 wpm). MT63 uses much more bandwidth, and is less sensitive, but because it transmits much redundant information using FEC, is much more difficult to jam.

Some modes are poorly designed, having inappropriate modems, or use excessive bandwidth with no compensating advantages. Modes to avoid in this respect include HF packet, Olivia and RTTY (on lower HF). Other modes use too little bandwidth, or an unfortunate

choice of keying rate, and so suffer from various ionospheric distortion problems. Some modes have very heavy FEC and other coding which considerably reduces the typing speed. For example Olivia operates at only 23 wpm, despite wide bandwidth, and has excessive delay. Most of the modes described below are well designed to have appropriate bandwidth and good efficiency. Advantages and any deficiencies are highlighted.

### RTTY

The first digital mode to see widespread use in Amateur circles (after Morse, that is), RTTY (Radio TeleTYpe) is a conversational or "chat" mode, and uses the ITA2 code to send a limited text alphabet, using frequency shift keying. Two tones are used, 170 Hz apart for Amateur applications. The transmission is about 450 Hz wide. Most Amateur operation is at 45.45 baud, while commercial services tend to be 50 or 75 baud. RTTY was designed for land-line use with mechanical machines, was never intended for DX radio operation, and suffers badly from multi-path effects. One lightning crash can cause a whole line of text to print in error.

RTTY still has a modest following, especially among mechanical machine enthusiasts, and it is still used for some contests. Perhaps the nicest sound card RTTY programs are TrueTTY by Sergei UA9OSV and MMTTY by Mako JE3HHT. Both have excellent tuning indicators and all the features one needs for simple yet slick conversations and even contests. MMTTY is more complex, but more versatile. MIXW by Nick UT2UZ and Denis UU9JDR is an excellent multi-mode alternative. For LINUX, OS-X, FreeBSD or Windows, the new free multi-mode program FLDIGI by Dave W1HKJ is highly recommended.

### PSK-31

PSK-31 was developed by Peter Martinez G3PLX as an RTTY replacement, and was the first Amateur "designer" mode. It is a slick keyboard "chat" mode, but is much more sensitive and robust than RTTY, and uses less bandwidth than almost any other mode. PSK-31 uses differential phase shift keying (BPSK or QPSK). Just one tone is used. In BPSK mode the data is transmitted without error correction, while in QPSK mode each symbol represents two bits, allowing an FEC error correction technique to operate. The bandwidth is a mere 60 Hz. On HF, the error



correction is disappointing, and PSK-31 is generally operated on HF without error correction. PSK-31 is very popular, is still the most popular digital mode, and has proved to be excellent for HF and VHF DX, despite reception errors. It is not well suited to trans-polar or trans-equatorial paths (such as long path to Europe) or short F-layer paths, as it is susceptible to ionospheric flutter due to the narrow bandwidth. It copes well with adjacent signals, fading and multi-path reception, and it is not unusual to work stations you can barely hear, even with several others in the receiver passband. Tuning is easy because even weak signals can be seen on the software tuning display. Because of the sensitivity, low power is all that is needed. There is a wide range of PC software for PSK-31. A good program to get started with is DIGIPAN, conceived by Skip K6TY for use with QRP "PSK Warblers", dedicated crystal controlled PSK transceivers. MIXW and MultiPSK by Patrick F6CTE are also popular, FLDIGI by Dave W1HKJ is an excellent choice for all popular operating systems.

### MFSK16

Developed by Murray ZL1BPU specifically for Long Path DX, MFSK16 has a most unusual and recognisable musical sound. It uses 16 tones, transmitted one at a time at 15.625 baud. It is significantly better for polar and long path DX than PSK31, as it is immune to polar Doppler effects, and has high multi-path resistance. It is also a very sensitive mode, and has also been found very effective for 80 m DX. The only trouble is that the tuning requirements are quite tough-the receiver needs to be within 4 Hz of the right frequency to receive, and drift must be less than 4 Hz per over. Since most modern transceivers easily meet these requirements, MFSK16 is quite popular for DX and regular rag chewing.

MFSK utilises special DSP techniques to enhance the performance and avoid ionospheric difficulties. With multiple tones, it is possible to achieve sensitivity not possible with RTTY, and also transmit more data per tone (four bits) than a two-tone or PSK system (one bit). This allows the baud rate to be reduced to counter multi-path effects, which are baud rate dependent. MFSK16 has strong Forward Error Correction, and achieves a typing speed of 40 wpm in a bandwidth of 315 Hz. Many programs are available for MFSK16. The original STREAM

by Nino IZ8BLY is highly recommended, as is MIXW, by Nick UT2UZ and Denis UU9JDR, and MultiPSK by Patrick F6CTE. FLDIGI by Dave W1HKJ has versions for Windows, LINUX, OS-X and FreeBSD. All four of these multi-mode programs also offer a narrow-band picture transmission mode controlled by MFSK16.

### DominoEX

This new mode was developed to provide high performance under Near Vertical Incidence Signals (NVIS) conditions, such as those on 80 m at night. This type of propagation is characterized by high angle F-layer refraction from the ionosphere, with deep fading and severe propagation delays. Most digital modes do not work at all well under these conditions. The mode was also intended to be as good as MFSK16 under DX operating conditions, and should be used in preference when a suitable range of software is available.

New Zealand is an ideal country for digital mode development, and has seen many innovations in the past. DominoEX is (like MFSK16, Sequential MT-Hell and PSK-Hell) a New Zealand invention, and was designed and developed here by Murray ZL1BPU and Con ZL2AFP. DominoEX uses a series of important new developments to improve the performance of MFSK. A special tone management algorithm ensures that the signal spreading caused by multi-path cannot affect reception; differential frequency coding is used, which eliminates frequency drift and offset problems and "spreads" interference at the receiver to minimize its effect; and a special "nibble varicode" provides highly efficient character coding.

There are several other innovations in this new mode, which is very simple to use. It has a synchronous tuning display which allows the signal to be seen clearly and tuned in even when very weak; it has a full extended ASCII character set which allows transmission of files and accented characters; and an extra "secondary" character set which sends pre-defined data when the transmission is otherwise idle. This data is displayed in a separate receive window. This facility has many uses, the most obvious being to provide full-time automatic ID of each transmission.

DominoEX does not require high power, and works well on 80m even when there is a lot of static, or evening multi-path reception. It is an ideal mode for low power portable or emergency use.

DominoEX is very robust without requiring FEC, although an FEC option is offered for when near-perfect reception is important. Six speeds are provided, so the speed can be changed to suit conditions. The default 11 baud mode suits evening and daytime conditions, and operates at 62 wpm, faster than most people can type. Early evening and low power suit using the 8 baud mode, at 50 wpm. FLDIGI by Dave W1HKJ has DominoEX and is available in versions for Windows, LINUX, OS-X and FreeBSD.

### THOR

This new mode from Dave W1HKJ is a cross between DominoEX and MFSK16, and has the benefits of both. It uses the differential frequency coding and 18 tones of DominoEX, along with a secondary text capability. It uses an extended MFSK16 binary varicode alphabet, allowing the use of control characters to support the HF ARQ protocol developed by Paul K9PS. The FEC is the same robust convolutional coder developed for NASA and used in MFSK16. This mode has the same symbol rates as DominoEX (but half the typing speed), is very effective in the presence of multi-path propagation, and as the name implies, this mode is extremely robust, especially in the presence of lightning noise. It is available in FLDIGI by Dave W1HKJ, which also provides ARQ operation with mail clients.

### MT63

MT63 is an amazing mode that would not have been possible without Digital Signal Processing. Developed by Pawel SP9VRC purely as an academic challenge, in this mode 64 PSK carriers are transmitted at once, each one carrying a different part of the transmitted signal. The data (which includes strong FEC) is spread across the width of the signal, and also spread in time, so MT63 is resistant to both time and frequency related interference. MT63 is very tolerant of poor operating conditions and interference. Unfortunately the signal is rather wide for a digital mode (typically 1 kHz), and very aggressive (causes interference but is not much affected by interference), so needs to be used with care. MT63 is an excellent mode for transmitting bulletins or leaving messages on unattended computers. Users often think that MT63 is very sensitive-this is not in fact the case-it just seems so, because the signal sounds like noise and looks like noise on the tuning display, and because it has such good error correction.

The MT63 software by Nino IZ8BLY is simple to use, easy to tune, locks on to the signal effortlessly, and is extremely robust. It is very sensitive, and excellent for DX under poor conditions. The MIXW version is even better, with higher sensitivity and better tuning tolerance. There is also a very good version of MT63 for LINUX in gMFSK by Tomi OH2BNS, and for all operating systems in FLDIGI by Dave W1HKJ.

### Olivia

Developed recently by Pawel SP9VRC, this mode is a marriage of MFSK transmission with the highly redundant FEC used with MT63. Unfortunately the typing speed is very slow, there is a long delay between transmission and reception, and the bandwidth rather wide. The performance in terms of sensitivity and interference rejection is similar to MT63, and the mode enjoys good drift and tuning tolerance. The most widely used version uses 32 tones in 1 kHz bandwidth, but there is a wide number of very confusing and non-compatible variations, difficult to tell apart, and differing in bandwidth, baud rate and number of tones. There are add-ons for these modes in MIXW, and Olivia is offered in MultiPSK and FLDIGI.

### Hellschreiber

This elegant mode almost became a lost art, but began an enthusiastic revival in the late 1990s thanks to the PC and sound card. Text and simple graphic symbols are transmitted uncoded, rather like sending the dots to a dot matrix printer. Because the signal has very high peak power compared with the average power, and is interpreted by eye rather than by electronics, the mode is very immune to impulse noise and requires little power. It is also immune to most ionospheric effects if tuned with care. Since tuning is broad, it is simple to use, ideal for HF and for satellite working.

Hellschreiber has a special appeal that occurs with no other mode except Morse; there is an immense "feel" that the operator has for the propagation of the arriving signal, and the uniquely recognisable "fist" (in this case "font") of the transmission, as well as the signal sound which changes with propagation. The user can choose any one of many fonts to transmit (even "Windows" fonts), although the original 1930s font is still the best. The data rate, typically 122.5 baud, provides a good 25-30 wpm typing speed, depending on the font used. Big



black fonts are best for DX, but tend to be slower.

The most commonly used mode is Feld-Hell, an on-off keyed CW radio mode which dates from the 1940s and predates RTTY. Invented by Rudolf Hell, Feld-Hell uses a single 980 Hz keyed tone. It is an ideal mode for 20 m, and performs well on other bands, even 80 m, satellites and moon-bounce.

The most sensitive Hell modes are PSK-Hell and FM-Hell, invented by Murray ZL1BPU and Nino IZ8BLY. These modes transmit the dots as phase reversals. These are excellent DX modes, very sensitive and (FM-Hell especially) not affected by ionospheric flutter in the way PSK-31 is. FM-Hell uses MSK modulation, and does not require a linear transmitter. The HELL80 mode is a Hell original from the 1970s. It operates at 245 baud using FSK, does not require a linear transmitter, and works well on 80m.

The best Hell software is IZ8BLY Hellschreiber by Nino IZ8BLY. It operates multiple modes, includes a very good tuning display, and is really simple to install and use. MIXW, MultiPSK and FLDIGI offer most of these modes, and there are other versions for LINUX (gMFSK) and MacOS (Cocoamodem).

### Fax and SSTV

These modes can also be operated with nothing more than a PC with sound card. Fax is very rarely transmitted on Amateur bands, although there is some interest in receiving weather maps on HF (black and white) and weather satellite images (grey scale) on VHF. Both of these modes are straightforward with software like Christian Bock's WXSAT program. The resolution produced by this software is incredible. On satellite pictures it is often possible to identify the South Island lakes, the Waikato River, and puffs of steam from White Island.

SSTV is a great way to share photographs, graphics and simple drawings with friends. The resolution is not very high, but the colour depth is good and the image content is restricted only by imagination and good taste. Much the best program to start with is MMSSTV by Mako JE3HHT. It helps if you have a scanner, digital camera or a good collection of digital images to send. SSTV is typically used to add interest to an SSB contact, and is also used on VHF FM, where picture quality is excellent. There are VHF SSTV nets in several parts of the country from time to time.

A new medium scan narrow-band

TV system by Con ZL2AFP offers picture transmission as fast as one frame per second, although resolution is more limited than SSTV. Two of the most popular modes are 48 x 48 pixel RGB colour (3 seconds/frame) and 96 x 72 pixel compressed RGGB colour (4.5 seconds/frame), although there are several others, including faster black and white versions. The NBTV system was designed for use on 80m and is reasonably robust.

The new system uses a remarkable OFDM FM modulation system, where each line of the picture is sent on a separate carrier. There is no sync transmitted, none required at the receiver, and so the transmission is efficient and reception not as prone to noise as conventional TV. The software can transmit AVI (movie) files, still and moving images, and can even use web cameras, digital and TV cameras and TV receiver cards. At the receiver, frames can be averaged to reduce noise, and transmissions can be saved and played back at a higher speed to restore true motion.

### Digital SSTV and DRM

Digital SSTV is a recent development that can be experienced if your computer has enough power. The sound card modem used is based on that designed for DRM (see below), but restricted to 2.4 kHz bandwidth. Each block of data includes a checksum, and if the picture is received with some blocks incorrect, a semi-automatic process can request repeats of the missing blocks until perfect reception results. Picture quality is superb—identical to the original picture, and images of any size and resolution are accommodated. Transmissions are also identified by a header which includes the call-sign and image details.

The software tends to expect the user to be an expert, so find an experienced user to help you get started. Signals need to be strong and noise-free, with good propagation conditions for transmissions to be successful. HAMPAL by Erik VK4AES and DIGTRX by Roland PY4ZBZ are probably the easiest programs to use. The WINDRM modem used was designed by Cesco HB9TLK, and can also be used for fast file transfer.

Digital Radio Mondiale (DRM) is a new wideband digital mode intended for MF and HF commercial broadcasting. Reception quality can be very good, with low distortion, and often in stereo, although few stations are receivable in New Zealand at present. The modem

uses sophisticated compression techniques, combining amplitude and phase modulation, allowing high sampling rates to be accommodated in 10 kHz bandwidth. There are several different formats allowing for transmissions up to CD quality. The mode is quite immune to fading, and does not suffer from selective fading that causes so much distortion on AM short wave broadcasting. A special receiver is required, but it is possible to receive DRM with a PC using the free DREAM DRM software by Volker Fischer, which works with a 12 kHz IF input to the sound card. A conventional receiver have an adaptor added to provide the 12 kHz output. The software also receives AM, SSB and FM, with very good quality. DRM can be transmitted using the same software, and has been demonstrated on 80 m by ZL1WTT using an adaptation of a digital phasing exciter designed by WITAG. High power is required for reasonable transmission range, and the transmitter linear amplifier must have very low distortion, and these conflicting factors makes this mode quite a challenge.

### FACTOR

A cross between Packet and AMTOR, FACTOR is a commercial and proprietary FSK system which provides strong error detection and ASCII text with an ARQ format. Efficiency is improved by a clever system where repeated damaged blocks of data are averaged until the check-sum is met, so a complete error-free block is not actually required for correct reception. Many of the newer HF multimode controllers offer FACTOR, and there are some applications for PC or other processor and external modem. PC sound card receive-only programs are available, but like AMTOR, no PC sound card software offers full capability. Pactor operates at 100 or 200 baud, and switches between speeds as conditions permit. There are more recent versions (FACTOR2 and FACTOR3), which offer even better performance, but require expensive commercial hardware.

FACTOR is popular for bulletin board use, and it is rare now to have a conventional contact using FACTOR. There are many Bulletin Board Stations (BBS) available on HF, some with connections to the Amateur Packet network, some with internet connection for mail forwarding. FACTOR is also widely used commercially. The WINLINK stations, for example, are fixed mail store-and-forward stations based around the world, with connection to the internet.

Each station has a frequency list that it scans every few seconds. These frequencies are mostly on 40, 30, and 20 m. These stations provide a service to marine and other registered mobile or portable operators, who call on one of the published frequencies. Once connected, the BBS controls operation just like a Packet system.

### LF and QRP Modes

Some modes are especially suited to weak signal operation, especially where the data rate can be very low, such as for beacons and for LF operation. Various types of Morse transmission are widely used, at a low speed (QRS) or very low keying speed (QRSS) that is read visually. One of the most popular ways to receive these modes is to use a Spectrogram such as ARGO by Alberto I2PHD, which was designed specifically for Morse modes such as QRSS3 (3-second dots) down to QRSS120 (two minute dots).

Often the Morse is keyed using an FSK technique which allows the dots and dashes to be the same length and eliminates the need for spaces between elements, speeding up the transmission rate. These modes can also work well for HF beacons and QRP operation. Hellschreiber modes are also popular for QRP, in part because the average power is much less than the peak power, an important factor in portable operation.

A new propagation monitoring system conceived by Murray ZL1BPU and realized by Joe K1JT has been breaking new records for QRP reception distance. Not only have 50mW signals on 30m been copied around the world with some regularity, but the mode has been successfully used for moon-bounce using 100W amplifiers and simple 4-element beams! The new mode is MEPT\_JT, and is operated in a similar manner to the QRSS weak signal modes.

Each message takes two minutes to transmit, and contains only call sign, location and transmitted power information. The transmission uses slow MFSK, and is only 6Hz wide. The WSPR software by Joe K1JT has numerous enhancements, such as copying multiple stations at once, and automatically posting correctly received 'spots' on an internet database. The system is used on all bands and about 20,000 spots are posted each day from around the world!

A system called PSKSounder by Con ZL2AFP can be used to measure signal propagation on any band. It has better resolution, narrower bandwidth (2.4kHz)

and much better sensitivity than previous 'radar' style techniques. It has been used successfully to measure propagation paths on 30m between ZL and VK6 using just 1W. Propagation delay from one station to another can be measured in real time with a resolution of 500us and a range of 15ms, making it ideal for measuring NVIS propagation. If the ground wave signal is available, absolute transmission time for each path can be measured.

Two separate programs are provided – a transmitter, run by one station, and a receiver, operated by others. The transmitter uses 2000 baud PSK, based on the STANAG 4285 modem. In addition to a repeated pseudo-random timing sequence, the transmitter sends a simple 'payload', typically the user's callsign and location. The receiver uses cross-correlation to locate the pseudo-random sequence and therefore can time and display the various paths over which the signal is received.

**Operating frequencies**

Narrow band modes (RTTY, PSK31) are to be found at the lower end of the digital allocation on each Amateur band, for example on 20 m from 14.070 to 14.099 MHz. Wider modes are found at the upper end of the allocation, for example on 20 m from 14.101 to 14.130 MHz. On 20 m the modes tend to be segregated to some extent, PSK31 at around 14.070 MHz, then Hellschreiber and other less used modes near 14.075 MHz, followed by MFSK16 and other narrow up to 14.080 MHz, where RTTY prevails. Wideband modes such as MT63 and Olivia are found around

14.109-114 MHz, with SSTV and digital SSTV around 14.230 MHz since they are used in conjunction with voice. A ZL Digital Modes net operates on Friday evenings on 3560 kHz LSB, from around 8:30 pm. All modes are demonstrated and discussed, and newcomers are very welcome to join in and experience the different modes. The net is the perfect place for assistance in setting up, and for asking questions about Digital Mode operation. Some digital modes operators listen on this frequency every evening, and there are Morse and DominoEX nets on other evenings. The operating frequency for most digital mode operation is usually quoted as the frequency the transmitter emits when idle, which in some modes can be measured with a frequency counter. For RTTY this is the mark frequency. For Morse, PSK-31 and Hellschreiber, it is the carrier frequency. MFSK16, MT-Hell and DominoEX signals are quoted from the lowest tone frequency. However, for complex modes like MT63, Olivia and SSTV, the frequency quoted is usually that indicated on the transceiver display in USB, since the tones transmitted and the sideband used are fixed by convention. Most digital mode operation follows the USB-LSB convention used for SSB (LSB below 9MHz, USB above, with now a noticeable trend towards USB on all bands). The exception is RTTY, which for no good reason is always operated in LSB. Some modes (Morse, PSK31, Hellschreiber, AMTOR) can be copied equally well on either sideband. Commercial operation is almost always USB, and the quoted frequency is the

transmission centre frequency.

**Packet Radio**

Packet radio utilises FSK and a protocol known as AX-25, which defines as automatic system to transmit blocks of information (called packets) which include the data, message type, information as to who the data is addressed to and sent from, and a robust error detection system called a Cyclic Redundancy Check (CRC). Packet radio is organised so that many stations can operate on the same frequency with limited interference. This technique is called Carrier Sense Multiple Access/Collision Avoidance (CSMA/CA). This means that stations listen for other signals before transmitting to avoid collision, but cannot guarantee not to cause interference to stations that cannot be heard. This situation frequently happens when stations on opposite sides of town share a BBS station. Most, but not all, packets require acknowledgement (an ACK), and the sender will repeat the packet until a correct acknowledgement is received. This technique ensures that the data is received correctly and compensates for collisions and errors, but as the channel activity increases, the useful data rate slows down significantly, as more and more time is spent correcting and sending requests for repeats. There is a special family of unacknowledged messages, called an Unconnected Information (UI) packet, that is widely used for beacon messages and for the Automatic Position Reporting System (APRS) developed by Bob Bruniga WB4APR.(4) The UI-View software by the late G4IDE is very popular for this application.

APRS networks operate in most centres, either using a local data repeater or the APRS calling frequency, 144.575 MHz. APRS is popular for tracking mobile stations equipped with GPS position location and equipment to automatically transmit the position, speed and heading of the vehicle. It is also remarkably effective for sending simple chat-type messages. The most common Packet format is 1200 baud AFSK using an FM transmitter. A device called a Terminal Node Controller (TNC) is generally used with a computer. The TNC contains both the packet controller and modem. The mobile APRS units only need to transmit, and so a small micro acts both as controller and modulator. Most packet radio operation takes place on 2m and 70cm. Appropriate frequencies are listed elsewhere in the Call Book. Data repeaters, similar to voice repeaters, provide increased operating range. These are listed in the Call Book 'Repeaters and Beacons' section

**References**

- All the software referred to is easily found by internet search by name or author. DominoEX, the Narrow Band TV and PSKSounder are available from [www.qsl.net/zl1bpu/ZL2AFP](http://www.qsl.net/zl1bpu/ZL2AFP).  
[1] Digital Modes for All Occasions, Murray Greenman ZL1BPU, published by the Radio Society of Great Britain, ISBN 1872309 82 8.  
[2] See Files folder on Call Book CD.  
[3] Install from Files folder on Call Book CD.  
[4] See [www.aprs.net/](http://www.aprs.net/).

**NZART's PRIORITIES:**

The interests of its TRANSMITTING MEMBERS, and, the access by

**RADIO AMATEURS** to bands throughout the RADIO FREQUENCY SPECTRUM,

by membership and active support of the

**INTERNATIONAL AMATEUR RADIO UNION.**



The DX Cluster Network has become the most popular and exciting way for Ham Radio operators interested in DX'ing (working the world) to exchange DX-related information in real time. If you are a keen DX hunter, then this is the place for you to be.

For example, a DXer who has just worked a rare DX callign, can post this information as a "spot" on the DX Cluster Network in real time, for the benefit of others who may wish to work this rare station. Or, if you are looking for a rare DX callign you can monitor the "spots" posted by others on the Cluster network.

DX Cluster servers are linked to one or more other stations around the World who have installed the same or similar software. These nodes when

connected are called a **cluster**. Clusters are connected to other clusters, expanding the network. Individual users can connect to any one of these Networked Nodes by either Telnet, or local Packet Radio Ports. Users are capable of announcing DX spots and related announcements, sending personal talk messages, sending and receiving mail messages, searching and retrieving archived data, and accessing data from information databases, among many other useful features.

DX Cluster Nodes have extensive filtering rules for the User to choose from. This means you can view only 80m spots, or 40m spots, or CW spots only, or SSB spots only. This is particularly useful during Contests when you wish to see only specific 'spot' information. Filtering is

vital to limit the flow of data on slow 1200 Baud Radio Links.

These features and many others are already built in to a number of dedicated DX Cluster client programs available today. It is now possible to have total rig control from the DX Cluster client program.

The two DX Clusters currently operating in New Zealand are up to date with the latest software versions and offer all of these features plus many more.

## Connecting to a DX Cluster Node

The two methods of connecting to a DX Cluster Network Node are Telnet via the Internet using a Telnet client program, and Packet radio via the Global Packet Radio Network.

Internet connection to ZL2AQY-10 is "Telnet:olson.net.nz" and Port 9000

Internet connection to ZL2ARN-10 is "Telnet:zl2arn.ath.cx" and Port 7300

Both ZL2AQY and ZL2ARN are "ported" to the National and Global Packet Network via the Xouter software. You will find Netrom entries AKDXC for ZL2AQY-10 and ZL2ARN-10. These entries will give you direct access to the respective Clusters.

If you are a keen DXer on any band including VHF/UHF/SHF, then the DX Cluster Network is the place to be for up to date information and news on who is doing what and where and when.

**Eddie Olson ZL2AQY**  
**Gordon Stewart ZL2ARN**

# AMATEUR RADIO RECORDS

## NEW ZEALAND VHF/UHF/SHF RECORDS 2011

Band	Frequency	Type	Stations	Date (DMY)	Mode	km	Prop	Notes
6 m	50 MHz	O/seas	ZL3VTV/I-EH7KW	03/04/2001	SSB	19921	F2	1. NZ 70 cm band has now been reduced from 420-450 MHz to 430-440 MHz. The TV Record of 31/01/1982 on 425 MHz lists as a 70 cm Record.
6 m	50 MHz	O/seas	ZL3JT-N6XQ	04/03/2001	PSK31	14268	F2	
6 m	50 MHz	EME	ZL2BGJ-W44NJP	08/09/1988	CW	13256	EME	2. NZ 13 cm band has now been reduced from 2300-2450 MHz to 2396 MHz-2450 MHz. The Records of 31/01/1982 and 18/10/1987 list as 13 cm Records. This band now known as 12 cm band.
6 m	50 MHz	EME	ZL3NW-F6FHP	03/03/2006	JT65A	19441	EME	
2 m	144 MHz	Int.	ZL1TPH/p-ZL4DK/p	13/01/2011	SSB	1074	TD	3. NZ 50 cm band has now been reduced and changed from 610-622 MHz to 614-622 MHz. The Record of 23/04/1988 lists as a 50 cm Record.
2 m	144 MHz	Int.	ZL1RS/p-ZL4DK/p	18/09/2010	FSK441	1405	MS	
2 m	144 MHz	Ext.	ZL1CN-VK4DMC	29/12/2007	SSB	3549	TD	4. /p means portable operation.
2 m	144 MHz	Ext.	ZL1BT-VK7MO	04/01/2007	JT65	2443	TD	
2 m	144 MHz	EME	ZL2BGJ-G3POI	26/05/1985	CW	18821	EME	5. /# means operating in another state or district.
2 m	144 MHz	EME	ZL3TY-EA5ZF	19/06/2005	JT65B	19242	EME	
70 cm	432 MHz	Int.	ZL2ARW/p-ZL1BJB/p	03/02/1982	SSB	1069	TD	6. Propagation Modes: Line Of Sight (LOS), Tropo Duct (TD), Tropo Scatter (TS) Meteor Scatter (MS), F2 layer and Earth Moon Earth (EME).
70 cm	425 MHz	Int.	ZL2TWS/p-ZL2ASF/p	31/01/1982	TV VSB	373	LOS	
70 cm	432 MHz	Ext.	ZL1IU-VK7MO	31/12/2005	SSB	2432	TD	7. Sporadic E is a propagation mode that is difficult to verify and is therefore listed as a Tropo mode.
70 cm	432 MHz	EME	ZL3AAD-G3SEK	12/03/1989	CW	18970	EME	
70 cm	432 MHz	EME	ZL2DX-HB9Q	15/11/2005	JT65B	18801	EME	
50 cm	610 MHz	Int.	ZL2UGR/p-ZL2AJI/p	23/04/1988	SSB/FM	302	LOS	
32 cm	925 MHz	Int.	ZL2TRV/p-ZL1TBG/p	30/11/2002	NBFM	620	TS	
23 cm	1296 MHz	Int.	ZL1AVZ-ZL4DK/p	14/01/2011	CW	884	TD	
23 cm	1296 MHz	Int.	ZL2ARW/p-ZL1THG/p	30/01/1982	SSB	687	TD	
23 cm	1282 MHz	Int.	ZL2TV/p-ZL1TPH/p	06/12/2008	TV WBFM	159	LOS	
23 cm	1296 MHz	Ext.	ZL1AVZ-VK2FZ/4	30/11/1995	SSB	2317	TD	
23 cm	1296 MHz	Ext.	ZL1TPH/p-VK9NA/p	13/01/2011	JT65C	898	TD	
23 cm	1296 MHz	EME	ZL3AAD-PAOSSB	13/06/1983	CW	18657	EME	
13 cm	2304 MHz	Int.	ZL2ARW/p-ZL1THG/p	31/01/1982	NBFM	687	TD	
13 cm	2403 MHz	Ext.	ZL1TPH/p-VK9NA/p	16/01/2011	FSK441	748	TD	
13 cm	2403 MHz	Ext.	ZL1TPH/p-VK9NA/p	16/01/2011	SSB	748	TD	
13 cm	2403 MHz	Ext.	ZL1TPH/p-VK4OX	27/01/2011	SSB	2314	TD	
13 cm	2403 MHz	Ext.	ZL1AVZ-VK4OX	27/01/2011	SSB	2317	TD	
13 cm	2304 MHz	EME	ZL2AQE-W3IWL/8	18/10/1987	CW	13931	EME	
9 cm	3456 MHz	Int.	ZL2AQE/p-ZL2ARW/p	06/03/1983	NBFM	547	TD	
9 cm	3400 MHz	Ext.	ZL1TPH/p-VK9NA/p	17/01/2011	SSB	748	TD	
5 cm	5760 MHz	Int.	ZL1TPH/p-ZL2IP/p	04/01/2011	SSB	551	TD	
5 cm	5760 MHz	Int.	ZL1TPH/p-ZL1SWW	03/09/2006	FSK441	48	TD	
5 cm	5760 MHz	Ext.	ZL1TPH/p-VK9NA/p	16/01/2011	SSB	748	TD	
5 cm	5760 MHz	Ext.	ZL1TPH/p-VK9NA/p	17/01/2011	JT65C	748	TD	
5 cm	5760 MHz	EME	ZM2TV-JASERE	24/04/2010	CW	9461	EME	
5 cm	5760 MHz	EME	ZM2TV-W5LUA	25/04/2010	SSB	12027	EME	
3 cm	10368 MHz	Int.	ZL1TPH/p-ZL2IP/p	04/01/2009	SSB	551	TD	
3 cm	10368 MHz	Int.	ZL1SWW-ZL1TPH/p	03/09/2006	FSK441	48	TD	
3 cm	10368 MHz	Ext.	ZL1GSG/p-DJ7FJ	12/03/1997	CW	18340	EME	
1.2 cm	24048 MHz	Int.	ZL1TPH/p-ZL2IP/p	05/03/2006	CW	169	LOS	
1.2 cm	24048 MHz	Int.	ZL1TPH/p-ZL2IP/p	12/03/2006	SSB	221	TD	
0.6 cm	47088 MHz	Int.	ZL1TPH/p-ZL1AVZ/p	01/05/2005	SSB	47	LOS	
2.5 mm	122280 MHz	Int.	ZL1TBG/p-ZL1TPH/p	06/02/2010	NBFM	0.3	LOS	

## Operating Modes Direct Connect

Where a repeater at one location (Node A) connects via the Internet with another repeater (Node B). With this type of link the two nodes or repeaters can be involved in the connection or resultant conversations. While repeaters "A" and "B" are connected, anyone attempting to connect with either node will be told by a recording that—"The node you are calling is currently connected to call-sign". All local traffic on each repeater will be heard on the other repeater as well.

## Reflector Connection

A reflector is a computer that is not connected to any radio, it is connected to the internet allowing many repeaters to be interconnected, redirecting received audio back to all other connected repeaters. At any given time there may be 2 to 10 repeaters around the world interconnected via a Reflector.

With reflector use a gap of approximately 10 seconds must be left between transmissions, this allows:

- For the delays created by multiple Tone Squelch radios in the links between the repeater and IRLP link.
- users on other nodes a chance to check in.
- other nodes time to send touch-tone commands to drop their node.

Also allow a delay of approximately three second from the time pressing the PTT button at the start of a transmission.

With IRLP your transmission is now being heard on many

repeaters around the world. To ensure intentions are understood give your callsign (phonetically) along with your name and QTH of the repeater you are monitoring for a call. Mobile listeners may only pick out your prefix, your name or QTH.

When calling a station state your intentions by always identifying whom your call is meant for.

Example: Several stations including a DX station complete a QSO and you wish to contact the DX station. Action: VK3xxx this is Mike ZL3TMB in Christchurch New Zealand. By doing this rather than just using your call-sign you leave no question whom you wish to contact.

## Making a direct connection

Listen on your local machine for 15–30 seconds before transmitting, ask if the repeater is currently in use. If all is clear, identify your self and give the node name or number you wish to call. Example: "ZL3TMB connecting to the Sydney node"—then enter the ON code for the node (node number then a 0) and release your PTT. Your local repeater will transmit carrier for a few seconds while waiting for the connection to be authenticated. Connections are confirmed with the transmission of the voice ID of the destination node and your node's voice ID on the destination repeater.

If your node is already connected to another node or reflector the greeting "your node is currently connected to ID of the connection" is played. In this case confirm if anyone desires the connection before closing it using the OFF code (node number then a 1 or just dial 73).

Once connected wait at least 15 seconds before transmitting because:

- The repeater may be in use, and your entry may have occurred between transmissions.
- The voice ID of your node is longer than the voice ID of their node, and the connection is not made until the ID is fully played.
- Their node computer may be slower, and hence take longer to process the connection than yours.

Press and hold the microphone PTT for a second and then announce your presence and your intention such as you are calling someone specifically or just looking for a QSO with another ham in that city.

If no response is heard, announce your call and your intent to close the connection then key in the OFF code (node number then a 1 or just 73). This a normal courtesy and a regulatory issue in some countries who may be connected to the reflector.

Some nodes are configured so you cannot connect to them if that repeater is active and the message "The node you are calling is being used locally" will be heard If your repeater is inactive for 4 minutes the connection will automatically close transmitting a voice ID disconnect message on both nodes.

## Connecting to a reflector

Listen to your local repeater for local use and then announce your intention to use the Reflector and send the ON command. When you hear the confirmation ID always WAIT at least 15 seconds before transmitting as you are most likely now connected with many

repeaters and a QSO could be in progress. If after 15 seconds you hear nothing, identify yourself and indicate you are listening to the Reflector from "City and Country". As your local repeater possibly now has world-wide coverage include your QTH.

Connections to the reflectors time out with no activity however many node owners set this to a long period so it is not unusual for repeaters with minimal traffic to stay connected to the Reflector for extended periods. When a node times out from a Reflector the message "Activity time out ... Reflector xxx, link off" will be played.

If you hear or wish to engage in a prolonged rag-chew on your local repeater out of courtesy to other node listeners drop the reflector.

## Error messages

From time-to-time you may receive connection error messages, common ones are:

"The node you are calling is not responding, please try again later", caused by a loss of internet connectivity to one end of the call attempt.

"BEEP Error—The call attempt has timed out, the connection has been lost", occurs when a node is OFF-LINE, or there may be temporary net or node problems. "The Connection Has Been Lost", the internet connection has dropped.

If you are new to IRLP you should always consult with your local node sponsor to confirm the local guidelines on reflector connections in your area.

The latest node numbers can be obtained direct from the IRLP website <<http://www.irlp.net/>>.

## New Zealand IRLP Nodes

as per <http://www.irlp.net>  
August 2012

NodeID	CallSign	Node City	Frequency	CTCSS
6095	ZL1AM	Whangarei	438.7	None
6398	ZL1BOI	Bay of Islands	146.75	None
6950	ZL1BQ	Auckland	146.7	None
6549	ZL1IS	Waikato Repeater Network	145.675	None
6609	ZL1KIWI	Hamilton	144.7	None
6777	ZL1KIWI	Hamilton	144.7	88.5
8434	ZL1KIWI	Hamilton	432.7	88.5
6394	ZL1KW	Kawerau	147	None
6105	ZL2AA	Gisborne	146.8	None
6793	ZL2AS	Hastings	147.25	None
6943	ZL2KO	Feilding	147.125	None
6081	ZL2KS	Blenheim	438.45	192.8
6285	ZL2KS	Blenheim	146.95	None
6910	ZL2LD	Masterton	147.175	None
6962	ZL2LV	Upper Hutt	0	None
6931	ZL2VH	Upper Hutt	147.3	None
6900	ZL3TMB	Christchurch	145.625	88.5
6397	ZL4AU	Invercargill	146.45	None
6184	ZL4DM	Dunedin	146.65	None
6507	ZL4JH	Dunedin	147.425	None
6642	ZL4QS	Alexandra	146.525	None

## International IRLP Nodes

as per <http://www.irlp.net>  
August 2012

Node ID	Node Call	City	Node ID	Node Call	City
1080	VE7RHS	Vancouver	1122	VE6TRC	Fort McMurray
1003	VE7ISC	Nanaimo		EchoIRLP #590955	
1010	VE7RHS	Vancouver	1126	VE7RBH	Smithers
1011	VA7IP	Birken	1130	VA7LPG	NanOOSE Bay
1015	VE7RNV	North Vancouver	1144	VE7FL	Castlegar
1020	VE7RNA	Chernabius	1147	VE7SQR	Squamish
1030	VE7VIC	Victoria	1148	VE7GDH	Salt Spring Island
1041	VE7BYN	Sicamous	1155	VA7EDA	Nakusp
1050	VE7RVN	Vernon (SIRG)	1164	VE7PEN	Penticton
1057	VE7SML	Tatlayoko Lake	1172	VA7YLW	Big White Ski Resort; Village
1066	VE4WRS	Winnipeg	1179	VA7RFR	PARKSVILLE
1068	VE6HM	Edmonton - EchoIRLP #51068	1180	VE7PQA	Parksville
1073	VE7RAD	Chilliwack	1188	VE6RCM	Medicine Hat
1080	VE7TSI	Kamloops	1205	VA4FIL	Winnipeg
1120	VE7KU	Port Alberni	1207	VE7BAS	Richmond
			1210	VE7DQC	Prince Rupert



Node ID	Node Call	City	Node ID	Node Call	City	Node ID	Node Call	City	Node ID	Node Call	City
1228	VE6MTS	Calgary	1890	VE6AAH	Porcupine Hills Lookout	2414	VA3IGN	Ignace	3052	K7TYP	Albany
1230	VE6ZV	Calgary				2430	VE3WFM	Waterloo	3055	AG0N	Scottsbluff
1260	SARA	Province-wide	1910	VE7RMR	Maple Ridge - EchoIRLP - #51910	2439	VE3LEX	Ajax	3057	W6CX	Mt. Diablo
1269	VA7SCA	Vancouver	1916	VE7PW	Williams Lake (SIRG)	2440	VE3COZ	Chatham	3058	KD7DPW	Reno/ SparksWINSYSTEM Affiliate
1270	VA6IRL	Lethbridge	1919	VE6AFP	Edmonton	2450	VE3RAK	Toronto			
1300	VA6CYR	Edmonton and Area EchoIRLP	1946	VE7EDA	New Denver	2460	VE3MUS	Cottage Country Huntsville	3061	KF6CHA	Los Angeles
			1980	VE7RSC	Surrey	2461	VA3BAL	Ballantrae	3065	KB7TEB	American Fork
1330	VE5CMR	Saskatoon	1981	VE4PIN	Pinawa	2470	VE3RPT	Toronto (Uxbridge)	3066	N5ZUA	Smithville - Saltgrass Link
1340	VE5BRC	The Battlefords	2000	VA3LU	Thunder Bay	2471	VA3XTO	Kitchener	3067	KF7BIG	Issaquah
1350	VE5SKN	Saskatoon	2006	VA2RMP	St. Jerome	2480	VE3RPL	Parry Sound	3068	W7BRY	Idaho Falls
1353	VE6QE	Red Deer	2009	VE9SJM	Saint John - EchoIRLP #285237	2482	VE3STR	St Thomas	3069	WA6AVR	Columbia
1370	VE5LAK	Prince Albert/ Christopher Lake	2010	VE7WHR	Whistler	2490	VE3KR	Walker Lk Huntsville	3071	KK7RV	Sierra Vista "OMIK"
1375	VE7DTT	Okanagan Falls	2011	VO1UM	EAST END ST JOHNS	2513	VE3YCX	Burlington	3073	AL2B	Kenai
1403	VE7ICA	Langley	2015	VE3JJA	Sioux Narrows	2520	VE3NRR	Pembroke	3075	KD6KAC	Gerlach
1404	VE3SPA	Pickering	2018	VE2REH	Gatineau	2524	VE3WHO	Sarnia	3077	N6TAP	Barstow
1420	VE7RAM	Tappen	2027	VA3XRR	Clarington	2567	VE3ZHR	Haliburton County/ ECOA	3079	N5GI	McKinney
1450	VA6SHS	Peace River	2030	VE1CRA	Charlottetown	2590	VA3SLT	Sioux Lookout	3080	KH6FV-2	Honolulu
1460	VE6TSR	Grande Prairie EchoIRLP 509961	2037	VE3TBF	Haliburton	2649	VE3ERX	North Bay	3081	WD0EKR	Canon City
1461	VE7RVA	Abbotsford / Chilliwack	2039	VE3RAG	Barrie	2650	VA3OME	Omamee	3082	N7ARR	Reno - Sparks NARRI
1469	VE7MLX	Mill Bay (SIRG)	2040	VE2CRA	Ottawa	2651	VE3RSD	Mississauga	3085	K5FOY	Mountain Home
1491	VE7OGO	Kelowna	2050	VE1NSG	Halifax	2680	VE3RSB	Burlington	3086	KC7DMF	Bend
1492	VE7MMG	W Kelowna - Crystal Mountain	2053	VE3IEV	Perth	2688	VE3LSR	Barrie	3088	WB9STH	Las Vegas
			2060	VE1WRC	Amherst	2700	VE3ORX	Orangeville	3089	W7DUX	Sisters
1500	VY1IRL	Whitehorse	2064	VE1PS	Beechville	2718	VA30PG	Brampton	3090	KB6JAG	Idyllwild - EchoLink#3091
1503	VE7VCR	Chilliwack	2073	VA30FM	Gravenhurst	2739	VA3DIS	Dryden	3091	W6JSO	Mazda Raceway Laguna Seca
1516	VE7GXA	Penticton	2075	VA3URU	Toronto	2750	VE3KBR	Kingston			
1524	VE7NOR	Vernon (SIRG)	2080	VE1WN	Greenwood	2759	VE3EOW	ECOA EMC COMM CANWARN	3092	AB0BW	Rochester Node
1537	VE6WTT	Calgary	2088	VE3FRG	Frontenac County	2768	VE3RIB	Atikokan	3093	WB5QHS	Lordsburg
1547	VE7BPN	Okanagan Falls	2090	VE3BIP	Belleville	2780	VE9ZC	Fredericton	3097	N5FAZ	El Paso
1550	VE5YQR	Regina	2108	VA3XPR	Toronto (downtown)	2805	VE9SHM	Moncton	3100	W6GLVX	Bakersfield
1557	VE4SLK	East Selkirk	2109	VE1BHS	Sugarloaf	2811	VE3SVC	Cornwall	3105	NM7R	Chinook - WIN System Affiliate
1560	VE7FFU	Terrace	2112	VE3ILN	Orangeville	2820	VE5NIP	Nipawin	3106	W0ANM	Saint Michael
1567	VE7RSO	Osoyoos	2115	VE3PRV	Hammond	2854	VE3BQR	Toronto	3107	WT9S	Tonopah
1570	VE5SCR	Swift Current	2120	VA3RZS	Peterborough	2860	VE3RQQ	Little Current	3108	WA0MFZ	Rapid City
1590	VE3TCR	Brantford	2121	VE3PRC	Brampton	2871	VA3PWR	Newmarket	3111	K7MAV	Paradise / Las Vegas
1645	VA7RMD	Prince George	2125	VE2RAX	Quebec City	2874	VE3NMN	Milverton	3112	KH6DQ	Honolulu
1649	VE7OVY	Victoria	2133	VE9TCR	Moncton	2882	VA3ERA	ECOA/ERA System	3113	K6IB	Fremont
1660	VE7CAP	Cranbrook	2150	VE9JTD	Richibucto Road (Fredericton)	2896	VE3ZZZ	Leamington, Wide Area	3114	KE6DEL	Huntington Beach
1662	VY1RPM	Haines Junction	2170	VA3BBB	Windsor	2920	VE3YRC	Newmarket	3115	WB6NDJ	Oakland (EchoIRLP)
1694	VE7RPT	Vancouver	2200	VE3OD	Georgetown	2948	VE3AZJ	Cambridge	3118	KMOR	Midway
1700	VE4SRR	Swan River	2202	VE3III	Windsor	2952	VE1YAR	Yarmouth	3124	NA0US	Longmont
1705	VE7ASM	Abbotsford	2203	VE3MUS	Huntsville	2973	VE1KIN	Bridgewater	3125	K6CBS	Hollywood
1710	VA5PAR	Yorkton - EchoIRLP #48431	2210	VE3TST	Ottawa	2998	VE3MIS	Mississauga	3127	W5AC	College Station
1725	VA6SVM	Olds	2236	VA3NLS	Edgar	3000	AH6LE	Beaver Creek, Wilsonville, Metr	3130	KC7BSA	Fruitland
1736	VE7RSC	Surrey	2248	VE3WCR	Niagara Region	3006	AD7LQ	Grantsville	3134	W7YC	Orlando
1737	VE7RSC	Surrey	2255	VE3WOM	Whitby	3007	KL7M	Wasilla	3135	K7MLA	Herriman
1747	VE7CRC	Campbell River	2260	VE3OVQ	Guelph	3012	AE6TV	San Dimas	3137	W7YC	Tucker
1750	VE4FFR	Flin Flon	2262	VO1UM	SHEARSTOWN	3015	N0SZ	Colorado	3138	W7YC	Colton
1755	VE7BSM	Nanaimo - EchoIRLP #428436	2268	VE1KEJ	Maitland Bridge (Keji Nat Park)	3017	WA6LA	Palos Verdes III [WALA]	3139	KB6Q	Nipomo Central Coast
1807	VE5LCM	Rocanville - EchoIRLP #425463	2271	VE3NIB	Toronto (downtown)	3018	N5XWD	Houston	3141	W6KGB	Oxnard
1809	VE4WSC	Winnipeg	2275	VE3KFR	Campbellford	3024	W6QNE	Bethel Island	3143	WA6HWW	Grants Pass-WinSystemAffiliate
1810	VE6PWT	Calgary	2280	VA3UW	Almonte	3025	N7SZY	Kellogg	3144	W7UDI	Ellensburg
1811	VE7EDA	Nakusp	2313	VE3NCF	Hamilton	3030	K6VE	Los Angeles	3146	W6RWN	Mission Hills
1822	VE4KEY	Winnipeg	2314	VE3YGR	Sudbury	3033	K7IOU	Tucson	3148	WA0VJR	Wallace
1840	VA6JAC	Edson	2330	VE3KON	Sault Ste. Marie	3034	N7BFS-2	Spokane	3149	W6REB	Santa Cruz
1849	VE7MTY	Pitt Meadows- EchoIRLP #44463	2332	VE2RAO	Gatineau	3035	N5XXO	Odessa	3150	W6YJ	Southern California
1850	VE6COM	Lethbridge EchoIRLP 2722	2340	VE2REA	Quebec city	3036	W6CBS	San Carlos	3152	WD5IEH	Victoria
			2363	VE1CFR	Summerside	3037	N50TY	Las Cruces	3155	W6VJ	Portable
1858	VE5SS	Preeceville - EchoIRLP #342958	2370	VE1HAR	Truro - EchoIRLP 161248	3039	W7RAT	Portland	3159	WB6SKS	Albany
1860	VE6BJJ	Airdrie	2390	VO1MST	Marystown	3042	K9OX	Beaverton	3160	W6YJ	Oceanside
1870	VA6XG	Edmonton	2400	VE3SUE	London	3043	N0PWZ	Colorado Springs	3161	W0RRZ	Grand Junction
1882	VE5PSC	Moose Jaw	2404	VE3ERC	Elmira	3050	KB5KZS	Bartlesville	3162	NF0T	Gilman
			2405	VE3SME	Simcoe (Norfolk County)	3051	KC6ORG	Perris ESPAÑOL	3165	K6SLS	Smith River WIN System
			2410	VE3RBM	Kitchener						

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3166	W7HTL	Las Vegas-Solar Site-4855'	3285	K6LIE	Albuquerque	3426	K7FAY	Boulder City	3560	WB6HII	Ferndale/Eureka
3167	KL7M	Willow MP 70 Parks Hwy.	3287	K6SOA	Laguna Beach	3430	N7PIR	Seaside	3561	WB0ZUR	Arlington
3172	N6FR	Sacramento	3290	N7ARR	Las Vegas NARRI	3437	N5KF	Georgetown	3564	W7RAT	Cannon Beach
3178	K7NAZ	Williams - Grand Canyon	3291	W0CRA	Denver	3440	AH6GR	Wailuku Heights, Maui	3565	KB7RRE	Sun City
3180	W6DRA	Palm Springs (Tram Repeater)	3292	K5NX	Conroe	3444	AH2G	HAGATA	3567	W0IT	Corpus
3182	AD7RL	Chino Valley	3293	K5NX	Kingwood	3447	KE6DEL	Littleton	3568	KF7FY	Pocatello - EchoRLP #520814
3183	WB6QAZ	Cloverdale	3297	WB6ZVW	Morgan Hill	3448	N6RBR	Redondo Beach [WALA]	3569	K4EZ	Hillsville
3184	K6IB	Fremont	3298	AD5ZX	Springdale	3450	N0SZ	Boulder [RMHR]	3570	N7HQZ	Ferndale
3185	KD0GTR	Pueblo West	3301	N7NGM	Prescott	3453	KB5YZY	St. Louis (Olivette)	3571	N7MRN	Pahrump
3188	K7OGM	Fish Haven - Bear Lake	3307	K7RDC	Gillette	3454	K7CSL	Tempe	3572	N7HQZ	Rio Dell
3190	WD8CIK	Holly Wood/ Mt Wilson	3309	N0NDP	Lees Summit	3455	KG6QIL	San Jose	3574	WA7GTU	Cedar City
3194	N7ARR	Las Vegas NARRI	3311	AF7DX	Sequim	3456	KG5BZ	Port Aransas	3576	WB7REL	Manti
3197	KH6FV-4	Kailua-Oahu	3313	KL7M	Palmer	3457	KB0GRP	O'Neill	3578	W7DES	Salt Lake City
3198	WA5QYE	Enid	3314	N6RDE	Portable-Mobile	3458	N6HHP	Downtown Los Angeles (WALA)	3583	K7EK	Lakewood/Tacoma
3203	NL7R	Valdez	3316	N6USO	Micro-Node Mobile, La Verne	3459	KL7M	Wasilla	3584	KD7KQG	Magna
3204	KB6JAG	Hemet - Echolink#416226	3318	K6BJ	Santa Cruz	3460	WA6LA	Palos Verdes I [WALA]	3588	KL7M	Anchorage
3205	KC7WSU	Saratoga Springs	3319	K7FED	Livermore	3464	W7TAR	Jackson	3589	N6SPD	Monterey Bay [WALA]
3206	K6MFM	Walnut Creek	3323	WA6SFY	Azusa	3465	AL7YK	Bethel	3590	N0BVE	Minnetonka
3207	WB6IAG	Paradise WinSystem Affiliate	3324	N7UJK	Aberdeen	3466	AL7YK	Bethel	3591	KB0TUD	Bridgeton
3208	K6TEA	So. San Francisco	3328	K0BVC	Mondamin	3467	KE0TY	Grand Junction	3592	KL7M	Anchorage
3210	W7CIA	Cascade	3331	KK6JAB	Santa Rosa	3468	K8BMC	Sandusky	3594	K5DJS	Micro-Node Mobile
3211	W7DBA	Huntsville	3332	K6IB	Fremont	3469	KS6I	Tehachapi	3595	W9NSS	Rogers
3212	WH6DEW	KAILUA-KONA	3334	AE6TV	Grand Terrace	3470	N6ICW	Sacramento	3598	WA6NHC	Cameron Park
3213	KE5NAJ	Rockport	3336	KE7OPJ	Henderson	3480	WA6LA	Palos Verdes II [WALA]	3599	KC7NQU	Yacolt
3215	K7MLA	Salt Lake City	3337	N5ZUA	Cat Spring	3481	KC7TIG	Moyie Springs	3600	K5VCG	Harlingen
3216	KE6TZG	San Bernardino	3339	W6DVI	San Gabriel	3483	KL7M	Anchorage	3602	K5FRC	Bonham
3218	NU5K	Houston	3340	WR6JPL	Pasadena	3484	XE1FUZ	Arandas	3606	KE4QAP	Micro-Node Repeater, Sophia
3220	N7GZT	Columbia	3341	N7OD	Hemet - San Jacinto Valley	3491	N7ARR	Pahrump NARRI	3607	KR7K	Clearfield
3221	KA1MZY	San Antonio	3342	KF5Y0	Lakeview	3497	AF6EQ	Sunnyvale-WIN System Affiliate	3608	NW0K	Colby
3223	W7UPS	Kennewick (Tri-Cities)	3343	AE6ZM	Lincoln	3498	K7FAY	Claremont	3611	N6USO	Micro-Node, Anywhere USA
3225	WA6UQZ	Lompoc II [WALA]	3344	N6DSP	Seal Beach	3499	K2ALB	Albany [ILS]	3614	K4MJO	Micro-Node Repeater, South Hill
3228	W6WLS	Santa Cruz/Monterey Bay	3345	W0BSB	Centennial	3500	K6JSI	San Diego - WIN System	3615	KF7NPL	Maple Valley
3229	W6RCA	Dixon	3350	N0POV	Denver	3501	WA6HSL	Spokane	3616	K0GFM	St. Louis
3234	N6SPD	Monterey Bay & County [WALA]	3352	W7SP	Provo/Salt Lake City	3503	KG7SD	Spokane	3618	K6PTB	Los Angeles
3243	WD5MHZ	Greenwood	3353	AL7LE	Soldotna	3506	KL7M	Anchorage	3620	KUGV	SF Bay Area
3244	N6EOC	San Carlos NOC	3356	W7JZU	Boise	3507	N7FM	Spokane	3623	KE6PCV	Corona
3245	K0HU	Humboldt	3359	HB9EYQ	Reinach	3509	W7KX	Carnation	3629	WB9STH	Las Vegas
3246	WB6KHP	San Jose	3362	W7WAC	Big Water, Lake Powell, Utah	3510	6K0FK	Seoul	3632	W03B	North Las Vegas
3250	N7BFS	Spokane	3363	KC7CUE	Eureka	3511	K6MFM	Maumelle	3634	KD70GD	Everett
3252	W6JAM	Tujunga	3364	K5VPW	Austin	3513	W0JAY	Seymour	3635	W5ICF	Houston,Tx-Sagemont
3253	KA6IYS	Weldon	3367	W6YDD	Sacramento	3514	K7SLT	Hayden	3639	W5LOS	Beeville
3256	KC5ZCH	Ellendale	3372	KD7KMU	Laramie	3515	KK7AV	Hagåtña	3641	N7ARR	Las Vegas NARRI
3257	KK7EC	Okanogan	3373	W7FAT/R	Auburn	3517	N5ZUA	Alexandria	3643	W5DCH	Corpus Christi
3258	W0WWV	Hastings	3375	K6TUG	Redding	3522	WB6WXO	Westminster	3646	W7AOR	Las Vegas
3260	N7ARR	Las Vegas NARRI	3376	N7SGV	Clark County ARES	3525	KL7M	Anchorage	3647	N5XFW	Hot Springs
3261	AL4K	Wasilla	3381	AC7O	Logan	3529	KC7LGT	Sequim Repeater	3648	KE7UOR	Brookings
3262	N7WMM	Donald	3382	N5SKU	Richardson	3534	KE5BR	Olathe	3650	KE6PCV	Los Angeles - Calnet
3263	KB0LCR	Watertown	3383	W9PCI	Central Point and North Valley	3535	N0SJK	Ogallala	3651	KE6PCV	Los Angeles - Calnet
3266	KD0S	Pierre	3387	WA2PVV	Chatham	3538	WK1RK	Detroit	3652	AB7F	Vancouver
3267	N5JAS	Moore	3390	WB2BQW	New Windsor	3539	KE5FGY	Wimberly - DBL	3653	K6IXQ	Costa Mesa WinSystem Affiliate
3268	KD0S	Pierre	3392	K06KD	Roseville/Citrus Heights	3540	K6IFR	Palm Springs	3654	W7YC	Fort Worth
3269	N5RWH	Houston-Clear Lake City	3395	KP4UZ	Las Vegas	3541	W7CTH	Twin Falls	3657	N5SIM	Pharr
3270	K7SDC	Castle Dale	3396	N7ARR	Tonopah NARRI	3542	K1BDX	Houston - Clear Lake City	3663	KI6SEJ	Fremont
3273	N1AXE	Houma (Simplex)	3398	N7VR	Billings	3543	KC7RJK	Eugene	3664	K6JRM	Ehrenberg-Win System Affiliate
3274	W5WTN	Las Vegas	3402	NA6M	Georgetown	3546	KI4VLH	Micro-Node in RV	3665	N7XG	Salem
3276	K7SKW	Bellingham	3405	N3ZUU	Breiningsville	3547	KC6AGL	Orange County, California	3666	KL1IO	Valdez
3280	WX7Y	Castle Dale	3410	K6HOG	Sylmar	3548	AB0VX	Honey Creek, IA	3667	WB6BDD	Pleasanton
3282	KF7QLH	Spokane	3412	K5SLD	Arlington	3549	WU7Q	Vallejo - marine mobile	3670	W5BMC	Morgan City
3283	KE5HTA	Houston	3417	NB7C	Payette	3551	KB6KPK	Orange	3671	K6SA	Saratoga
			3418	N3TOY	Las Vegas	3553	KI4ODI	Lansing, KS	3673	K6TZ	Santa Barbara
			3420	N7PIR	Portland	3556	K6VGP	Mount Disappointment	3674	WB7WAM	Yakima
			3421	WR6ABD	San Jose - LPRC - WIN System	3558	NZ6L	San Pedro			
			3425	KB8ENV	Cleveland, Ohio						



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3676	KB5GAS	Albuquerque	3828	WA6AXO	Juneau	3967	N6SGX	Hemet	4120	KF6SWL	Omaha - WIN System Affiliate
3677	KE7NTF	Brookings	3829	WB5UGT	Lufkin - Saltgrass Link	3969	K7KAB	Loving/Graham	4127	WB0AFB	Milwaukee
3679	K7VVI	Kent Covington				3972	WB0QMR	Breckenridge	4128	WC4PEM	Bartow
3686	KA6AMR	Duarte	3830	WB5EKU	Los Angeles	3974	N0JPX	La Veta	4130	WA2ZPX	Middletown
3692	KB7KB	Bozeman	3831	KE7FGB	Green River	3976	W7BO	Woodland	4133	W1MRA	Marlborough
3693	AA2V	Milwaukie	3833	KB0JWR	Bismarck	3978	K7LWH	Seattle/Kirkland/Bellevue/Redm	4134	KP4EOP	Chicago
3695	N5GI	Dallas/Ft. Worth/McKinney	3834	KL7M	Ham Lake				4135	WP30Y	Chicago - Echo 6334
			3835	WROU	Mt. Pleasant / Westwood	3979	N05DE	Albuquerque	4136	W1MRA	Weston
3696	WB5UGT	Bastrop	3836	W7YC	Slidell	3984	KA0BSA	Steamboat Springs	4137	K8KHW	MCConnelsville
3698	KB8JXX	Anchorage - WIN System Affil.	3837	N7GTE	Jackson Park	3986	WD5IEH	Gonzales	4138	ND1U	Notre Dame
3699	N1UPS	Westminster	3839	KC0KWD	Greeley	3987	W6COH	Hemet - EchoLink#39871	4139	N2STU	West Sayville
3701	WL3WX	Bossier City	3840	K6IXA	Atwater	3989	K5DX	Houston	4148	WA2RYY	Bayshore
3703	WB6ZVW	Morgan Hill	3843	AD5OU	Houston	3990	W0CRA	Denver	4155	W0AC	North Port-Echolink # 41555
3704	W5SLAW	Lawton	3847	K6JSI	Fresno - WIN System	3992	KE7FZX	Lake Stevens			
3705	N7ARR	Mesquite NARRI	3848	WA6DKS	Granada Hills	3993	K7IEU	Raymond	4156	WC4PEM	Bartow
3710	WA4HND	Grand Junction	3849	K0AMJ	Excelsior Springs	3994	K6LNK	Northern California and Nevada	4159	W1HDN	Vernon
3711	WB5MQP	Commerce	3850	W7FDF	Tucson				4163	K8BMM	Morgantown
3713	WS5D	Clovis	3854	KC0CVU	Colorado Springs	3995	K0NXA	Springfield	4167	N8JPR	Grand Rapids
3715	WD6FZA	Santa Monica	3856	KD6RC	Santa Rosa	3996	KL7M	Victory MP 90 Glenn Hwy	4168	K8SN	Grand Rapids
3717	KD5AR	Arkansas State University	3859	K6LDK	Valencia	4000	WA3KOK	Washington	4169	KA6UHV	Collegedale
			3860	WA7SPY	Folsom	4003	W3ZR	Eagles Mere-EchoIRLP #3997	4171	KN2R	Cape Coral
3722	K0ELK	Carbondale	3865	KE6LGE	San Antonio				4172	N3AY	Elizabethtown-Echo IRLP
3726	KR6WP	Redwood City	3867	W5DEL	Oklahoma City	4007	W4XKE	Crossville			
3727	K6JSI	Intertie	3869	WA5DTR	Spring	4012	KC2RQR	Staten Island	4176	WD9GWW	Osceola
3732	KL1DA	Glennallen	3876	NJ7J	Clearfield	4013	N8DP	Gladstone	4179	W4UNC	Chapel Hill
3734	K6KYA	Napa	3880	W6YDD	Sacramento	4016	KE2EJ	Plainview	4183	KA4VXR	Hampton
3737	W6BUG	Portola Valley	3881	KJ7IY	North West Washington County	4017	KB3SNM	Spring Grove (S. Central PA)	4184	KK2OQ	Brooklyn-Park Slope
3740	KC2QVT	Westampton							4186	KE8O	Delaware-Columbus
3741	WI6RE	Ridgecrest	3882	K6TEA	South San Francisco	4022	K4PAL	Miami / Fort Lauderdale	4187	WB9TLH	Kirksville
3745	KE6HRV	Buena Park (Orange County)	3884	N6EW	Los Angeles (B.A.R.C. 4 )				4200	AA4LB	Simpsonville
						4025	KC2VUX	Wellsville	4203	KF8YK	Chardon
3747	WX5FWD	Fort Worth - NWS SKYWARN	3886	N5ZUA	Portable Micro-Node Repeater	4031	K9IU	Bloomington, IU ARC	4204	N2VYS	New York City
3750	W0KU	Golden	3887	AC0KC	Fort Lupton	4032	WB5LHS	BATON ROUGE	4207	N2LEN	East Windham NY
3751	K5RNB	Aubrey	3890	N4OKL	Huntsville	4036	KI6DXN	Fullerton	4208	KS4BO	Roanoke
3753	N5ZUA	Bayou Vista	3892	WD7F	Tucson	4037	KB3DXR	Huntsville	4209	AC4DM	Nancy
3754	W7RUG	Idaho Falls	3894	KD6WAB	Salem	4038	N3XXH	Laporte	4213	KC9IXL	Argos
3755	WA7RVV	Medical Lake	3897	WB6IWY	Cornelius	4039	N3WPL	Warren [ILS]	4216	WA00JS	Corpus Christi
3767	AF6SP	Hacienda Heights	3900	K6MF	San Jose	4040	N3CDY	Baltimore	4221	N90B	River Falls
3769	KS0GLD	Goodland	3901	KG6FOS	Bakersfield	4042	KB9E	Carbondale	4222	KB2SOZ	Macedon
3770	K1BDX	Houston - Clear Lake City	3902	K1TJ	Fort Collins	4049	W9LKI	Angola	4223	NC2EC/R	Malverne
			3904	N7DEN	Cheyenne	4053	W2RAC	Daytona Beach	4227	KC2UFO	Merritt Island
3771	AC70D	Monroe	3907	KA6GEM	Piedmont	4055	KG4YJB	Petersburg-Etrick	4229	N2XZS	Selden
3772	K1BDX	Austin - Bee Cave	3908	K9VKG	Sioux Falls	4065	WB4GQX	Cumming	4234	N3KZS	Ocean City
3774	KC0HH	Lamar	3911	KF6QBW	WIN System Affiliate, Glendale	4067	WB2JPQ	Eden [ILS]	4235	WB8VSU	Dayton
3775	K1BDX	Mobile Node - Houston				4068	WB2JPQ	Buffalo [ILS]	4243	W0NWA	Pinnacle Peak
			3913	N7JYS	Russell	4069	W4SNA	Micro-Node, Winston-Salem	4245	NB1MA	New Bedford
3776	K1BDX	Mobile Node - Houston	3914	W5MCC	New Orleans				4246	N2TDI	Palm Coast
			3916	WA7BND	Portland	4072	WB3IGM	Kane	4250	WR2ROC	Rochester
3777	K1BDX	Mobile Node - Houston	3917	N7JYS	Hays	4075	KP4E	Grosse Pointe Farms	4251	AH6EZ	St. Charles
			3923	KG6PH	San Diego	4076	KB4PTJ	Williamsburg	4252	WR2ROC	Rochester
3779	KB0BWG	CASA GRANDE	3926	KG6ATN	Foster City	4084	WL7BHJ	Murfreesboro/Smyrna	4253	N9UMJ	Williams
3781	K6SOA	San Clemente	3929	KC7TIG	Sandpoint	4085	KP4TR	Tampa Bay	4254	W2FCC	West Arlington
3785	W6AMG	Thousand Oaks	3930	K6MF	San Jose	4086	AE1TH	Braintree	4260	KD4RAA	Raleigh
3787	KL7M	Fairbanks	3934	W0MA	St. Louis	4088	WA3KOK	Ashton	4265	W2YMM	Bethpage - Long Island
3793	K7FAY	Parker	3936	W0FLO	Chadron	4090	KB2FAF	Cortland			
3794	KC0VJD	Limon	3937	AB6PA	Moreno Valley	4091	K8KHW	Constitution	4270	KD4RAA-2	Raleigh
3795	WD5IEH	San Antonio	3938	N6EOC	San Carlos NOC	4097	K2GII	Winter Haven [ILS]	4274	KF5IRG	Between Dallas & Tulsa
3797	N7EN	Gilbert	3939	K9GAJ	Santa Fe	4098	KA9OHV	Warsaw			
3798	W6GOP	Ripon	3941	WB6AIA	Hemet - EchoLink#39419	4100	N3FE	Portable	4282	WR8ABC	Lakewood
3802	KJ6VU	San Jose				4103	WB2WJF	Lantana [ILS]	4287	WB2SNN	South River
3803	WA6UHF	Chico	3942	WD0BQM	Mitchell	4106	W8VFR	Eaton	4288	KA0JQO	Mountville
3805	W7YC	Carrollton	3946	W6SMV	Templeton, CA	4107	WA2ZPX	Patterson	4289	AE9J	Danville
3806	W7LKO	Elko	3951	K5COD	Victoria	4110	K0PCG	Des Moines	4291	N3HF	Ocean City
3809	WA6E	Loomis	3953	NX5V	Springdale	4111	W2WDW	West Palm - Echolink #41119	4292	W1AW	Newington
3820	KC7GHT	Phoenix - EchoIRLP	3954	KL3BD	Kotzebue				4294	W9GAP	Ogdensburg
3821	W6PBX	Quincy	3956	K5NES	Desha	4114	N4FU	Vesta	4299	WB8APD	Willoughby
3826	N7GV	Green Valley	3957	N1NG	Spokane	4115	W5NRU	under construction (aa5sg)	4306	AF2A	Ithaca
3827	WB6IAG	Mini-Node Mobile	3959	K5CNM	Carlsbad	4117	KC2LRC	Syracuse			

Node ID	Node Call	City
4308	G0TTQ/ W4	Foley EchoIRLP node
4309	W2AMC	Peconic
4312	W8SAI	MASON
4314	KB1GXW	Boston
4315	W9YB	West Lafayette
4316	KB9KLD	Maryville
4317	K3ZMC	Pottstown
4318	N4DFQ	Somerset
4320	NS1N	Norwell
4322	W1TOM	Springfield
4326	KE7EZJ	Kent
4328	KE5QJQ	Baton Rouge
4329	KC2JES	Lyndhurst
4330	K9WZ	Plymouth
4331	K4QJZ	Front Royal
4338	N4ARG	Kissimmee
4341	W5LSV	Leesville
4344	N1HUI	Branford
4346	AB20Q	Blasdel
4347	W1AEC	Dartmouth
4354	KF3EM	Hummelstown
4355	W1FY	Framingham
4358	K4TJS	Yorktown
4364	KA4BNI	Weakley County Echo/IRLP node
4370	KT8APR	Lima
4372	KB1FX	Woburn
4373	K8DAA	Holland
4377	W2OEM	Springfield
4380	W9BCC	Wausau
4388	W1MV	Bridgewater
4391	N8KQQ	Muskegon
4393	W1JLI	Norwood
4395	KB1AEV	Vernon
4396	N2JBM	East Northport
4397	K4RCC	Sylva/Waynesville
4411	N2NFI	Manorville
4417	W8DOW	Livonia
4419	WA3ITR	Whelsley
4424	W4RAT	Richmond
4427	NS1RA	Danvers
4428	W2PUT	Milan [ILS]
4434	KB2WVY	Venice
4437	N2WNS	Boonton
4438	W2VL	Glen Oaks
4441	KB4TYE	Durham
4442	NN4NC	Clarkton
4448	KB3HIY	detailed info never submitted
4449	KB2AYS	Blue Anchor
4450	N8DNX	Stutsmanville
4455	W9DWP	Northern Kane County EN-52
4456	N2AMB	Brooklyn
4460	WB8NXP	Southfield
4463	KA8YRL	Jackson
4464	W2CEB	Hudson (Spring Hill) [ILS]
4466	K2ACY	Brigantine
4469	WA2JSB	West Orange
4473	KA1IFQ	Oxford
4478	W2KPQ	Selden
4479	K8LI	Delta
4480	K1IMD	Eastern Long Island
4486	N1UEC	Wrentham
4490	WB2CIK	West Hills
4491	WA2WWK	Amherst [ILS]

Node ID	Node Call	City
4494	KC6HUR	Sun Valley
4501	W9PQ	Melbourne
4502	W8HP	Beverly Hills
4503	KB4PTJ	Williamsburg
4505	W1GHW	Fairfield
4512	N9VMR	Chicago
4522	WA7RZW	Gray
4523	W8AK	Dayton
4525	G4ZPZ	Micro-Node Mobile, Manchester
4527	WA2EPI	Lake Hopatcong
4529	K8RPT	Maybee
4542	WA3KOK	Clarksville
4544	AB2OR	Lackawanna
4545	W4AKH	Fort Pierce
4546	WB3EHB	Camden
4547	KC8RBZ	Cincinnati East Side
4549	KB0IXM	Fargo
4550	W4DOC	Atlanta
4551	WA2ZLB	Manhattan
4557	N4SJV	Charleston
4563	W2PUT	Detroit
4568	W1EAV	Marion
4571	N1ZZN	Marshfield
4576	AF2M	Orlando
4577	N3GX	Chesapeake
4579	K1RFD	Norwalk
4589	K7FAY	Poorman's Portable Node
4590	N1HUI	Branford
4591	K2ILH	Amherst / Buffalo
4597	N8XHZ	Tiffin
4604	WW2ARC	Ocean Township
4609	KC9HZT	Greenville
4610	WA1NVC	Framingham
4617	W1SMA	Fairhaven
4618	KB9QJN	Merrill
4619	N9DKH	Green Bay
4624	N3HFK	Hopkinton
4635	W8LRC	Lowell
4637	N4TCP	Clayton
4640	N5LEZ	Wichita Falls
4641	KB4CRG	Huntsville
4642	K8BRC	Bangor
4643	N8EOD	Walker
4647	N4BSA	Clearwater
4654	K0NOD	Clearfield
4660	WR3S	Nashville
4663	W1WPD	Woodbridge
4664	K1PL	Cromwell
4665	KB2RF	Freehold
4666	K2MTB	New Paltz
4667	NR4P	Boynton Beach
4669	N8TWM	Mansfield / EchoIRLP *46692
4670	N9UWE	Danville
4672	K4KWQ	Deland
4676	W2MSK	Bergenfield
4677	N2NFI	Eastern Long Island
4678	W4WSM	Bowling Green
4689	W1IMD	Portland
4700	WR2UHF	Hauppauge [ILS]
4705	K4TTC	Hohenwald
4709	W9BCC	Wausau
4712	N3HF	Silver Spring
4715	WB2JPQ	Eden [ILS]
4718	NG8Y	Pleasant Plain
4719	W4UAL	Tuscaloosa

Node ID	Node Call	City
4727	N9OEQ	Appleton
4730	K9IP	Indianapolis
4732	K9IP	Grandview
4733	W9EI	Could be anywhere
4734	W9EI	Portable
4735	K9DC	Indianapolis
4737	AB8E	Elkins
4739	WB4BSD	Cleveland
4740	N2MH	West Orange
4745	KD4HLV	Loganville [ILS]
4747	K2CC	Potsdam
4751	N1UEC	Wrentham
4752	KE6YRU	Indianapolis
4762	WA2QDP	Pittsford
4769	KE4SCS	Petersburg
4772	KC0ARF	Green Bay
4777	W2QW	Green Brook
4787	KI4VFB	Ft. Lauderdale- Echolink #47873
4788	KA9VZD	Antioch
4789	K2GE	Sayreville
4790	K3TAT	Media
4793	W3FL	Orange City [ILS]
4799	W2WHS	Webster
4810	KF6FM	Riverside
4812	KC8QVX	Jonesville
4816	N9EOC	Noblesville
4818	KB8ZGL	Greenville
4819	N2NEI	East Hampton
4823	K2KNB	Old Bethpage
4824	N1RCW	Sandwich
4827	WA2GUG	New Hyde Park
4834	KB9VE	Anderson
4844	N2LYJ	Buffalo
4850	W9CEQ	Aurora
4851	KC4SCO	Research Triangle Park
4853	K4HV	Valkaria
4861	K8TEK	Ottawa
4864	W2GGI	FT LAUDERDALE
4866	NC4FM	Rocky Mount
4867	W3SC	Pottsville
4868	WK8H	Vermontville
4878	K2GLP	Sag Harbor
4880	N4TCP	Tampa
4882	WB0CPR	Philadelphia
4885	AA5SG	Portable - Ellisville
4886	K2SDR	Sea Girt
4887	KA4EPS	Deerfield Beach
4888	AE6MP	West Covina
4889	KC2IVI	East Greenbush
4898	KP4WK	Tampa Bay
4900	AF4TZ	Nashville
4903	K4GRW	Newport
4908	W2SO	Lancaster
4910	WA3ADI	Havertown
4915	K2RMX	Brooklyn,Sunset Park
4923	KB2ERJ	Camillus
4927	W9BIF	Goshen
4935	W2NJR	Asbury Park
4939	K9WSS	Westmont
4941	KL7M	Anchorage
4942	W1CLA	Brookline
4943	KB4ZIN	Williamsburg
4948	N3CB	Plymouth Meeting
4949	K4ZPZ	Orlando
4950	W4VM	Huntsville
4951	N2PDO	Long Island
4960	N9GPY	Culver

Node ID	Node Call	City
4961	N9GPY	Culver
4969	W2KPQ	Plainview
4975	WA4RYW	Knoxville
4977	K1RJZ	Boston
4978	W1MRA	Marlborough
4979	K9GXU	Belleville
4987	W70TQ	Virginia Beach
4992	KE7ULC	Vail WIN System Affiliate
4994	W9UUM	La Crosse
4995	W4RAT	Richmond
4998	K6IFR	Edom Hill
5014	SM6VBT	Mölnadal
5046	GB3EE	Chesterfield
5050	K7QDX	Portland
5056	EB8CTT	Las Palmas
5060	K6LRC	Lake Almanor - Susanville
5090	N0MFB	Danville
5097	MB7IMR	Marske by Sea
5100	G4CUI	Sheffield
5113	GB3WJ	Scunthorpe
5120	M1ERS	Sheffield
5130	GB3DV	Maltby
5140	GB3LF	Kendal
5160	K9VKG	Sioux Falls
5165	M0RGN	Wigan
5190	DL1KGW	Wuppertal
5196	GM1PLY	Edinburgh
5199	EA2BKH	Zaragoza
5200	G4NJI	Rotherham
5228	MB7IAR	Arisaig
5234	EI7DUR	Dublin
5264	2E0PMT	Micro Node, Houghton Green
5267	DM0IBM	Hannover/Laatzten
5280	GB3CA	Carlisle
5289	G4WLI	Middleton, Manchester
5294	MB7IUR	Leicester
5302	GB3OA	Southport
5307	DB0BH	Buehl/Black Forest
5314	ON0RCL	Leuven
5355	EI2MGR	Mullaghannish Mountain
5361	GB3FH	Cheddar
5365	DM0MHD	Pfaffenhofen
5367	LA8HRR	Nesna
5370	W9DUP	Downers Grove
5378	DM0QN	Munich (east)
5380	W5EVH	Laredo
5385	2E1EDB	Gateshead Nr Newcastle
5400	GB3PZ	Manchester
5410	GB3KE	Bearsden, Glasgow
5426	GM0LZE	Lewis Island
5429	GB3ZB	Dundry Hill, Bristol.
5434	*	
5450	GB3PZ	Manchester
5452	M1ATM	Denton Manchester
5453	MONNH	Northampton
5466	LA8VRR	Mosjoen
5467	LA9KY	Rodoy
5469	LA9KY	Seloya
5483	DM0ZGW	Wuppertal
5503	MB7IIP	Ipswich
5514	G0VXN	Freckleton
5520	KC4SFA	Key Largo [ILS]
5530	KE6YRU	Indianapolis



Node ID	Node Call	City	Node ID	Node Call	City	Node ID	Node Call	City	Node ID	Node Call	City
5533	G6VVM	Harrogate	6122	VK7AX	A Radio Broadcasts & Gateway	6702	VK4RGC	Gold Coast	7117	WB8GEO	Cleveland / EchoIRLP #44119
5550	KD7PSG	Bellingham	6124	VK7RTV	NWT-ATVG 6M Repr Gawler	6705	VK3ANT	Melbourne Echo / IRLP	7118	WA7RZW	Gray
5555	MB7IXN	Freckleton	6136	VK3CHN	Sunbury	6707	VK6RAA	Mt Barker, Western Australia	7123	W6JID	Eatonville Winsystem affiliate
5560	N7TGB	Reno	6163	VK4JKL	Cairns	6729	*		7125	KF5CRF	Lawton
5562	GB3IR	Richmond	6184	ZL4DM	Dunedin	6739	VK7RAD	Queens Domain, Hobart	7141	KF7QLH	Spokane
5566	GB3IP	Stafford	6200	VK6RFM	Perth	6747	VK3YVG	Yarra Glen	7150	KL7M	Pippin Lake MP81 Richardson Hy
5569	GB3MH	Crawley	6202	VK5LY	Riverland	6762	VK4RBY	Mackay - WIN System Affiliate	7161	H18LEZ	Santo Domingo
5582	GB3TR	Torbay	6214	VK5ARG	ADELAIDE	6777	ZL1KIWI	Hamilton	7164	NV7L	Reno Nv.
5588	LA1PHA	Mo i Rana	6217	VK3JD	Melbourne, Australia	6781	VK2HMC	North Epping	7166	KL7UT	Red Dog
5600	GB3LV	London	6220	VK2RSC	Lismore	6789	VK3CRG	Lara	7190	WD6BNG	Barstow
5603	HB9TVW	Basel	6232	VK6RBY	Harvey, Western Australia	6793	ZL2AS	Hastings	7191	K0NXA	Crane
5610	K6VGG	Los Angeles	6239	VK7VKT	Claremont - Hobart	6794	VK3RLP	Cranbourne, Melbourne	7192	KP4IP	Millersville
5612	GB3DQ	LOOE	6247	VK3RBW	Melbourne	6800	VK8MA	Katherine	7195	AG6AU	Placerville
5620	WA7GIE	Salt Lake City	6250	VK2ROT	Paddington	6865	VK5RMN	Port Pirie (The Bluff)	7197	WB8GRS	Little Elm
5685	LA9JDA	Bodo	6255	VK2ARS	Terranora	6875	VK5RSE	Millicent	7200	V21ARC	St. Johns
5689	MB7IDD	Reigate	6260	VK2RWG	Wagga Wagga	6900	ZL3TMB	Christchurch	7205	AD7DD	Otis Orchards
5690	WE8N	Warren County	6262	VK6XLR	Geraldton EchoIRLP	6909	VK5RAE	Pt. Augusta (Mt. Arden)	7210	W9KXQ	Greenville
5702	GB3BM	Birmingham UK	6285	ZL2KS	Blenheim	6910	ZL2LD	Masterton	7213	H18LEZ	Higues
5708	GB3XN	Langold	6287	VK3RBN	Burrumbet EchoIRLP	6919	VK4GF	Victoria Point	7214	KG6DKE	Pleasanton
5709	DG3IC	Rohrbach	6300	VK3RMC	Melbourne	6931	ZL2VH	Upper Huft	7217	K5IN	Olympia
5717	G3SNA	Greenfield 12m NE Manchester	6310	VK3RWA	Western Victoria	6943	ZL2KO	Feilding	7221	W5NB	Lafayette
5750	W6KAP	Volcano- Sacramento- Stockton	6312	VK2RCC	Warrumbungles Linked System	6950	ZL1BQ	Auckland	7222	K7ZH	Beaverton
5756	EA5RCI	Elda	6320	VK3RRU	Merbein	6958	VK4RDD	Toowoomba EchoIRLP	7224	AD6NM	Micro-Node Mobile
5767	EI7CRG	Castlebar	6327	*		6964	VK4BWI	SE Queensland	7225	WA2WOJ	Henderson
5770	KC4VDZ	Richmond	6330	VK3RSP	Mt. Martha	6973	VK4RAR	Rockhampton	7227	AE6TV	Grand Terrace
5790	NE7AL	Could be any where	6343	VK8RWI	Darwin	6983	VK4RED	dalby & district	7229	WA7RVV	Mobile
5799	SK4SQ/R	Leksand / Mora	6350	VK3RMH	Melbourne	6992	VK3RGV	Shepparton	7230	WB1GQR	Bolton
5800	K2GXT	Rochester	6360	VK3ROU	Glen Waverley	7001	KH6RS	Kaunapali Maui	7232	K7NEL	Layton
5822	DB0RDT	Ingolstadt	6363	VK3RIT	Wangaratta - (North East Vic)	7007	W0DK	Boulder	7237	WA6DKS	Granada Hills
5841	W5DCH	Corpus Christi	6366	VK2RBM	Sydney, Blue Mountains	7008	KP4IP	Maricao	7241	W5MMX	Conroe
5850	KJ6W	Palmdale	6370	VK3RSR	Melbourne, Australia	7018	KH6RS	Wailuku Maui	7244	N7ARR	Ploche, Lincoln Co, NARRI
5852	2E0TWS	Sheffield	6372	VK3RAJ	Upwey	7019	KH6RS	Ulupalakua Puu Mahoe	7249	KD6KAC	Gerlach
5860	K7SPG	Seattle	6373	VK3RPL	Portland	7020	KH6RS	Mt. Haleakala, Maui	7250	N2HJD	Rochester
5870	KC0EFC	Lenexa	6375	VK3IBM	Ballan	7027	K1LA	San Diego	7260	W4ECZ	Spring Hill
5877	W6IOS	San Jose	6380	VK3RNE	Albury-Wodonga (Myrtleford)	7030	K6JV	Oxnard	7268	N0FH	Estes Park
5883	EI7MLR	Waterford City	6397	ZL4AU	Invercargill	7033	N6ZEN	El Granada	7270	KX1X	South Hadley
5907	IK2XYP	Gambolo	6402	VK4RLW	Browns Plains	7035	K1GYYW	Lakeport	7273	W7UZ0	Spokane [ILS]
5918	MB7IWR	Dewsbury	6404	VK4RC	Redcliffe	7036	KL3JC	Alexandria	7274	VP2MQ	Gerald's
5920	N1JBC	North Providence	6450	VK4RMK	Mackay (Mt Blackwood)	7037	W6UHF	Cohasset	7279	KB0YNA	Grand Junction
5930	WB2RRA	Nyack	6464	VK4RCM	Gympie EchoIRLP	7040	KP4EOP	Deer Park	7283	W6ECE	Magalia
5939	GM3ZXG	Greenock	6482	VK3JD	Melbourne	7041	KH7Y	Ocean View	7287	N0SWE	Rifle
5947	2E0WLY	Stourbridge	6493	VK4TIM	Eastern Brisbane	7042	W6MKJ	Sacramento	7290	W2RN	Wood-Ridge
5953	G7HIF	Wellingborough	6500	VK5ZY	Eudunda	7045	N7RON	Rawlins	7291	KL2GY	Anchorage
5960	N1BOW	Niantic	6506	VK3RVZ	Melbourne	7046	N0AHL	Aberdeen	7306	NG0W	Morris
5993	G3TMD	Scotter	6510	VK5RAC	Port Lincoln	7051	W0EQO	Woodbury	7309	AH7GK	Honolulu
6008	VK3EGC	Loch Sport	6527	VK2JJW	Buttaba, Lake Macquarie	7052	N2JBM	Luquillo Beach	7310	N7QJB	Cheyenne
6009	VK5IRL	Murray Bridge	6543	VK3XKA	Lysterfield	7058	WH6CDT	Kahului	7319	WD6FZA	Mailbu
6010	VK2RRR	Razorback Range (RF offline)	6549	ZL1IS	Waikato Repeater Network	7059	KL2QV	Palmer	7331	W5LLR	Justin
6015	VK2ABP	Bathurst	6564	VK4RSC	Sunshine Coast EchoIRLP	7060	W3ND	Harrisburg	7337	N7ARR	Amargosa Valley Nye Co NARRI
6018	VK2RMP	Maddens Pl Wollongong	6572	VK3ATL	Geelong	7067	W6TRW	Redondo Beach	7340	WB3LGG	Cochranville
6037	VK4REP	Central Highlands and District	6584	VK5RCT	Moonta - Copper Coast	7068	KA7G	Lakeside	7341	K7PAL	Seattle
6040	VK2RTZ	Newcastle	6600	VK6RWR	Wickham	7070	WA00JS	Manchester	7342	KP3IV	Manati
6050	VK2RCZ	Blacktown	6613	VK2RGN	Goulburn	7077	KC7TIG	Oldtown	7344	AE5RJ	El Paso
6060	VK2RAG	Gosford	6616	VK7RTV	NWT-ATVG 2M Repr Gawler	7085	KC00CV	Georgetown CO- EchoIRLP	7351	NP3KQ	Bayamon
6063	VK3RBO	Bendigo	6642	ZL4QS	Alexandra	7097	K6JV	Rancho Mirage	7354	WP4MMZ	Nolanville
6081	ZL2KS	Blenheim	6669	VK4KTX	Logan Central	7102	KD7SU	Sinclair	7355	XE1AO	Colima
6095	ZL1AM	Whangarei	6700	VK7TAZ	Mt.Barrow, North East	7107	KL2ZF	Nome	7358	W6PBX	Quincy
6097	VK3XOK	Batesford				7110	W7DK	Tacoma	7359	KC8UQP	Kingman
6100	VK6RNC	Perth				7113	WA7RZW	Gray	7362	NE7AL	Morrow
6105	ZL2AA	Gisborne				7114	KA5YIX	Houston	7363	*	
6110	VK1RBM	Canberra				7115	K7PTT	Reno	7369	WL7LP	North Pole
6111	VK2HKF	Westen Sydney							7371	*	
6113	VK3CDN	Melbourne							7374	W7BMW	Seattle

Node ID	Node Call	City	Node ID	Node Call	City	Node ID	Node Call	City	Node ID	Node Call	City
7375	N0GR	Minden	7572	N6HOG	Sierra Peak, Corona	7804	K5FZH	Tigard	8000	SK6BA/R	Kinna
7377	W7TWA	Seattle - WIN System Affiliate	7576	W7BOZ	Logan	7810	NS9M	Terre Haute	8003	KN4CI	Moulton
7378	WW7SEA	Seattle - Queen Anne Hill	7584	WA7G	Napa	7814	W2MGM	Bakersfield	8005	XE2PNA	San Luis Potosi
7379	W7NNQ	Renton	7588	K7DAA	Morgan Hill (mobile node)	7815	W6RCA	Greenville	8006	KD8OZS	Perrysville / EchoIRLP *638298
7383	K7TRO	Salem	7589	N7KQ	Clay Springs	7816	H8CR	Santo Domingo	8010	SK4AO/R	Falun
7385	W5DK	San Antonio	7594	KE5FWI	Hillsboro	7817	KC0WNG	Miller	8026	KC8OZA	Gahanna
7397	N7ACM	Reno	7597	W7NLV	North Las Vegas	7820	WB2HWW	Queens/ New York City	8035	N1UPS	Westminster
7398	K5MES	Fort Smith	7614	N0IQ	North Platte	7821	J88AZ	CHOPPINS	8048	KB3EAW	Media
7401	N7SWW	Clearfield	7620	W7ARA	Phoenix (Downtown)	7823	N0NDP	Lee's Summit	8050	SK6QW	Gotene
7402	KB6Y	Covina	7621	W6DLO	Grass Valley	7824	W7GNP	Tempe	8051	KB3CXQ	Aurora
7403	N60NF	Rancho Cucamonga	7627	N0UGO	Hershey	7826	KI6VEY	South Lake Tahoe, CA	8053	KC9SGV	Hoffman Estates
7406	W6RHC	Chico	7628	K7WWA	Willits	7828	AE6FW	Sunnyvale	8058	WR2AHL	S. Bristol
7407	VK5CP	GLENELG	7638	WA7ABU	Salem	7830	WB2NBU	Wellington	8059	XE1ZAT	Toluca
7408	KE7UDX	West Seattle	7639	KL7MT	Willow	7831	W5MLE	Carencro	8064	K5TTS	Lansing
7413	K6KUS	Whitefish	7645	N5BZM	Groves	7832	KD0ROH	Altoona	8066	7J1YAA	Shinjuku-ku
7416	W7IF	Spokane Valley	7648	N7QVU	Overgaard	7837	N6IQY	Yuba City	8068	KB4YFK	New Kent County
7420	W6RCA	San Carlos	7649	K7HUW	Vancouver	7842	N0ECT	Avon	8069	JP3YHP/R	Hirakata
7421	N6RJA	San Pedro	7650	N6ICW	Sacramento - Lake Tahoe 147.19	7846	KD6CNS	Mokelumne Hill [6M]	8090	LA9XR	Heggedal - EchoIRLP #3422
7424	KL7GJ	Eagle River	7655	HI8LEZ	Santiago	7851	NP2Q	St. Thomas	8091	K4GET	Plantation-WINSystem Affiliate
7429	KC0OUP	Denver Radio Aficionados	7661	*		7852	W7SAA	Salem	8093	JA2WSM	Seki City
7430	K7LYY	Kalispell	7666	K1LA	San Diego	7853	KE7YOR	Montpelier	8094	W8NBA	Pataskala
7431	KF6CHA	Los Angeles	7670	W6RLW	San Jose	7855	KC5IPK	RIO RANCHO	8097	JJ2YIW	Shinjuku, Tokyo
7432	KF7QLH	Spokane	7675	NP4WP	Aguadilla	7867	N6BKL	Lone Pine [6M]	8112	KG6LYI	Coronado
7435	KL7M	Anchorage/Ch11	7681	KC7VE	Renton, Wa. (Jeep Fixed)	7870	KA6UAI	Palomar Mtn	8113	WC1P	Winchendon
7436	KL7STE	Eagle River	7682	KE7ZWP	Ridgefield	7873	WA7DG	Reno	8114	KI6IGR	Canyon Lake
7437	KL7AA	Anchorage	7683	K56P	Citrus Heights	7877	HI8LEZ	Santo Domingo	8115	WX5ASA	Altus
7439	KB8JXX	Anchorage	7689	K5FX	CCG Austin & Echolink K5FX-R	7879	K7MMA	Spokane	8117	N2WLS	South Wales
7449	N0JPE	Fairview	7696	K7NBO	North Bend	7884	KD0CST	Urbandale	8120	WA6BAI	Visalia
7453	KJ6RFQ	Elk Grove	7697	KP4MPR	Aguada	7892	WA6M	Timber Cove	8127	KC1AR	Naples
7457	K6IS	Sacramento	7699	KL7BM	Anchorage	7893	WK7B	Phoenix	8128	KC1AR	Naples
7460	N7TWB	Phoenix	7700	W9PCI	Central/Eagle Pt.-Med-Ashland	7894	N0NDP	Holden	8129	K8KHW	Newport
7461	KE7EFB	Mobile	7701	N7BHB	Ephrata	7896	K8KHW	Little Hocking	8136	N0EXE	Galesville
7464	N6SBC	Hollister	7702	W7LAD	Grand Junction	7899	KD6LKM	Modesto	8139	WB8ODF	Jonesville WINSystem Affiliate
7466	WD6FGX	Willits	7705	AD7OV	Vernal	7900	KN4KL	Virginia Beach	8140	*	
7478	KC0SHM	Wheatland	7706	NM5HD	Albuquerque	7901	K5FRC	Bonham	8144	ZS1JEN	Cape Town
7479	KC0MWM	Grand Island	7707	KD7AGA	Casper	7902	AJ2E	Aurora	8150	N6AWQ	Southern California
7480	N4JDW	Wilmington	7708	WR0AEN	Denver	7905	HI8CR	Constanza	8155	KS3M	Abbottstown [S. Central PA]
7489	KF6EIA	Lakeport, Ca.	7710	W4JAZ	Cocoa	7908	W7ECA	Great Falls	8164	JQ1YWK	Hachioji, Tokyo
7492	N5CG	Little Rock	7714	N0JPX	La Veta Mobile Node	7909	KE7IEE	Portland	8165	WB6JAR	Wildomar
7496	W6KL	Burbank	7717	KA7NSR	Tempe	7911	AE5R	Harlingen	8176	K8SEA	Osseo Screamin Eagle's ARC
7497	KF5ENG	Duchesne	7720	N2HLT	Branchport	7918	NK2V	Las Vegas- Echo/IRLP E # 4691	8186	W2HCB	Selden [GSB]
7500	9Y4AT	Valsayn	7724	KF5BRU	Harrison	7922	KL7M	AllStar Hub Anchorage	8187	KB2AHZ	Muck Cross VA 442&147
7501	KB9QNF	Milwaukee	7727	AA2V	Nano Mobile Node	7929	KF5ENG	Duchesne	8193	K0DMF	North Branch
7502	KI6VEY	South Lake Tahoe*	7729	K6TEM	Arcadia	7930	N8HEE	Charlotte	8203	KC9EQQ	Aurora
7503	KL3DO	Fairbanks	7734	K5GLH	Oklahoma City	7935	W7DRC	St George	8223	XE3REM	Merida
7505	K1SOX	West Haven	7736	KF5NAQ	Lawton	7937	W7EAT	Eatonville	8232	WA2CBS	New York
7506	KG6SLY	Northern California	7737	KK2NY	Patchogue	7943	KF6SWL	Omaha-win system affiliate	8233	N4XJQ	South Punta Gorda
7510	W7TRO	Lewiston	7738	KE5YKM	Kenedy	7945	K0UPS	Westminster - UPS Mobile Node	8235	K2BR	Egg Harbor Township
7512	V44KJ	St. Kitts and Nevis	7741	W0JRL	Denver	7950	WB4IVB	Corbin	8240	KR6WP	San Carlos
7517	K7NEL	Layton	7742	WZ6L	Vallejo	7955	N7ABC	Rock Springs	8242	W9OSL	Green Bay
7520	W4YI	Chattanooga	7746	K0KAD	Post Falls	7956	XE1DVI	Los Angeles	8247	XE1YMY	Toluca
7522	N2MOO	Reno	7752	KB0SRS	Salt Lake - UPS Mobile Node	7960	KL7M	Trapper Creek MP 115 Parks Hwy	8249	W1AEC	Dartmouth
7529	KP4AP	Santo Domingo	7758	WL7CWZ	Kodiak	7962	WA6NHC	Cameron Park	8260	W6HY	Crescent City
7531	W9ICE	Indianapolis	7764	W5NS	Bartlesville	7964	KI6VEY	South Lake Tahoe, CA	8263	K9EQ	Ham Lake
7534	K2XI	Farmington	7766	KJ6NRO	Sonora	7967	K5NX	Humble	8266	WB5LHS	Baton Rouge
7536	KG0S	Omaha	7767	9Z4FZ	Arima	7970	WA6TMJ	Hanover Park [WALA]	8267	KG6LIN	Thousand Oaks
7540	W6CBS	San Carlos	7772	N0AFO	Vail	7976	W0FUI	Hot Springs	8269	N9WCX	AURORA
7547	W7UZ0	Spokane [ILS]	7777	KP4EOP	Rio Grande	7977	W5GC	Seguin	8270	K40BX	Hatteras Island
7549	KE7IEC	Monroe	7787	K7EAR	Safford	7979	K7PQX	West Linn	8273	W2KTV	Whitesboro
7556	AC0WA	Shawnee	7791	KF7MLE	Portland	7982	WA6UHF	Chico	8274	XE3NO	Oaxaca
7557	WP4DCK	Philadelphia	7795	WW7SEA	Seattle - Columbia Center	7989	KX0N	Ottawa	8275	N8NAP	Mobile
7561	KL3DM	Mobile in Alaska	7796	WP4IUO	Humacao	7990	K6MFM	Sacramento	8277	N3VSI	Micro-Node Edgewood, Md
7562	KL3DM	Chugiak	7797	KJ6JD	Sacramento	7992	PJ2BR	Willemstad	8279	W7QO	Atlanta
7563	W0SBS	Tonville EchoIRLP									
7565	WM5D	Rogers									
7566	KB1HSZ	Eufaula									
7570	K0NL	Phoenix									



Node ID	Node Call	City	Node ID	Node Call	City	Node ID	Node Call	City	Node ID	Node Call	City
8280	N16M	Clovis	8429	XE2NHM	Allende	8628	EA8EE	Las Palmas	8757	XE1TH	Tulancingo
8281	WH7BR	Volcano	8433	W1GZ	Fitchburg	8632	JQ1YFK	Minamikoma	8770	KB7ZPL	Vancouver
8287	KC2YWA	Long Island	8440	W5DEL	Oklahoma City WIN System	8635	W4MEV	Richmond	8778	W8EOC	MEDINA
8298	N2HAK	Durham	8474	XE1CRG	Irapuato-Leon-Salamanca	8641	W2WDW	Lake Worth - EchoLink #86410	8779	KB8ZGL	Lowell
8299	N8SX	Concord	8478	KG4HOT	Charlottesville	8643	NY2PW	Babylon [GSB]	8786	WJ8E	Oregon
8300	ZS5KZN	Durban	8484	KB3SDE	Philadelphia	8645	AB9OV	Chicago	8789	W2GGF	FT LAUDERDALE
8311	KF4OVA	Kernersville	8492	K3HTK	Noblesville (EchoRLP- 730083)	8648	JF9LGL	Hakusan City	8798	XE2GF	CREBC, Tijuana
8317	N4FOB	Port Charlotte	8499	JS1LQI	Koto, Tokyo	8651	NP3CZ	CHESTERFIELD	8808	W6TRI	Champaign
8318	XE3DSD	San Cristóbal L.C. (Radioclub)	8501	XE1VY	Morelia	8659	WA9KJE	Chicago (Simplex)	8812	*	
8321	AC4DM	Nancy	8510	KL7M	Girdwood MP 90 Seward Hwy.	8661	ZS6STN	Johannesburg Sandton	8824	K4HEK	Deland
8322	K8KHW	Marietta	8520	N2TLD	Lake Grove	8662	ZS2PE	Port Elizabeth	8825	W8SMK	Delaware
8327	NY2SI	Staten Island	8529	KK2NY	West Islip [GSB]	8665	KD7QHJ	Eugene	8832	*	
8332	JQ1YEG	Meguro-ku	8535	ZU9DCM	Cape Town	8672	NN1D	Fall River	8838	KC4AAC	Palmer Station
8335	XE1RCQ	Querétaro	8536	K4OBX	Buxton	8676	W3YT	Baltimore	8847	W2GGI	Delray Beach-EchoLink #88477
8342	K1RBY	Knoxville	8550	AA8CC	Buckhannon	8677	XE2SI	CREBC, Tijuana	8851	XE2SI	CREBC, Ensenada
8350	KC7TIG	Rathdrum	8557	KD8MZD	43130	8682	NS1RA	Salem	8855	XE1GQP	Guadalajara
8365	XE2LRD	Durango	8561	AJ4RC	Roanoke Rapids	8685	KC2RA	Brooklyn, NYC	8866	WD8IEJ	Archbold
8369	W2GGI	MIAMI	8562	KD3SU	Boonsboro - Portable Node	8687	JR2FJl	Kawagee	8883	W2YMM	West Islip - Long Island
8373	WT4RA	Isle of Wight -EchoLink #88373	8566	KW4GT	Orlando	8691	WA1NPO	Whitman	8892	WB2ZEX	Brooklyn
8374	KJ4KDG	Hampton	8578	AA8RK	Ann Arbor	8709	K4RPT	Melbourne	8895	XE2LRS	Durango
8378	XE2LLP	CREBC, XE2LLP Mexicali	8581	W1GCD	Gardner	8715	AJ4SF	CAMERON	8910	K4LX	St. Petersburg
8380	W9FEZ	Fort Wayne	8582	N2FMC	Chappaqua	8717	KC0MPD	Beverly Hills, FL	8913	W9PXZ	Joliet
8383	KA7G	Sun City West	8600	PI2EHV	Eindhoven	8719	ZS0JPL	Pretoria	8919	*	
8390	k7rmr	Ellensburg	8601	WA2QDP	Wellesly Island	8721	K9OI	Schaumburg	8921	KD8GEH	Troy
8402	W5YL	Houma	8616	KC6PXL	Samborondon prov del Guayas	8727	W5EVH	SouthTexasLink System.com	8929	N2QKV	Brick
8409	WA2ZST	Southampton	8620	PI6EHN	Eindhoven	8730	K6KYA	San Francisco - WIN System Aff	8930	KB0WYT	Scottsbluff
8410	WB6TCS	Oakland	8622	JA9LJI	Tsuruga	8739	W9TVM	Columbus / Fort Benning	8950	MOHBK	Englefield Green
8420	K6BIV	Mt. Diablo	8623	WB2HWW	not provided by owner	8748	KB8STK	Shiloh / EchoRLP *553196	8952	XE1RCS	Ciudad de Mexico
8421	N8NQH	Bellbrook	8626	JA2VOF	Shizuoka city-EchoLink too	8755	W3WDD	Cullowhee	8954	JN2UNC	Upper Nagoya City
8424	KI6DES	San Antonio Winsystem Affiliat							8955	N1WW	Athol
8426	KB1VKY	LONGMEADOW							8993	KB0P	Marquette
8427	ZS0JPL	Pretoria									
8428	W9EAR	Vincennes									

## ECHO LINK

Developed in early 2002 by Jonathan Taylor K1RFD, EdhoLink is a computer program using the Voice-over-Internet Protocol to establish long-distance communications (DX). The program has spread rapidly among the ham community and is today used by over 120,000 radio amateurs in 150 countries. Instead of using ionospheric layers to establish long-distance communications, K1RFD suggested to amateurs to use the Voice-over-Internet Protocol, using the Internet in combination with RF linking and especially with VHF and UHF FM transceivers to work other amateur stations.

### EchoLink has four main user groups

#### Repeaters

(Eg, ZL3CAR-R) where a computer is connected to a local repeater by radio and any number of people in range of the repeater can use the system.

#### Links

(Eg. ZL2VBC-L) this normally means that there is a simplex radio link at the remote station, normally less range than a repeater station.

#### Home stations

(Eg. ZL3TMB) a ham's computer is connected to the Internet, normally this is a home station. Using headphone and a computer style microphone (no ham gear is required, just a call-sign).

#### Conference servers

(Eg \*ZL1VK\*) these are just a computer with a very fast Internet connection, no radio gear is required by a server. These servers allow many stations to connect together.

The Papakura Radio Club operates an EchoLink conference server, \*ZL1VK\* (node 65001). Make sure you connect on Sunday nights from 7pm (New Zealand time) onwards. This server can be used to link computers, simplex radio links and repeater for running

local, nationwide or international nets. It is available for both open nets or private nets.

#### Operating Guidelines

Usual operating practice on EchoLink is to operate just as if you were on amateur radio. If any link station (call-sign-L) or repeater station (call-sign-R) are connected to the conference, you are on the radio. Be aware that other users may be anywhere in the world. Please use commonsense and courtesy. Specifically, pretend you are on a busy repeater. That means:

- Identify with your call-sign now and then. You don't need to ID every transmission.
- Leave a pause of a few seconds between transmissions. This gives others a chance to break in. It also lets linked radios and repeaters drop out, so they don't get timed out.
- If several people are active in conversations, consider turning it over to one specific station at the end of each transmission. Don't consider this mandatory, though. If there is a logical next

person to speak, let that person speak. If not, then a simple rule is to rotate speakers in a fixed order. (The on-screen station list makes this easy. It is kept sorted with the most recent speakers on top. So just turn it over to the station on the bottom, or the lowest station who is actively participating.)

- If you want to have a long conversation with one other station, and the subject is not going to be interesting to others, consider dropping out of the conference and connecting directly. If you talk about something interesting, please stay on the conference.

For more information and a copy of the software, check out any of the following links: <<http://www.echolink.org/>>; <<http://www.hamradio.co.nz/>>; <<http://www.qsl.net/zl1vk/>>; <<http://www.qsl.net/zl2ufi/>>.

The RadioSport' term is widely used internationally these days when talking about amateur radio contesting. Amateur Radio contests first started around 75 years ago and they now come in all shapes and sizes, from big international 48 hour marathons on six HF bands, to just a one hour 'sprint' with other ZLs on 80m. Contesting is an Amateur Radio growth area! Most international HF contest organisers report yearly increases in the number of contest logs received and participation numbers. Contests can provide great incentives and opportunities for improving operator technical skills, station equipment set-ups as well as actual on-the-air operating skills. Contests are great fun as well, as the basic object is of course to work lots and lots of other stations within a defined period. If you chase DX, then contests are also great occasions to improve your personal DXCC Award standings.

### Operating categories

There are single mode contests, others are multi-mode, eg. single-band, all-bands, CW-only, phone-only, RTTY-only, PSK-only, mixed-mode, QRP, low-power, high-power, single-operator, multi-operator and combinations thereof and there are heaps of certificates to be won to decorate your shack with. For instance in both the Phone and CW CQ WW Contests there are around twenty-five First-Place certificates available just for ZL stations!

### Operating procedures

Contest QSO exchanges are brief and to the point and easy to pick up.. Probably the best way for contest newcomers to learn the procedure is to listen on bands during a major contest. There are just two type of contest contacts; either you reply to a station who is calling CQ, or you call CQ yourself and wait a reply from someone else. Make sure you're familiar with the rules for the particular contest before you start of course. Each contest has its own requirement of what information should be exchanged between stations. This 'Exchange' often just consists of an RS(T) report and a 'Serial Number', starting with 001 and incrementing by one for each contact. In some contests the Serial Number is replaced by other information, such as CQ or ITU Zone Numbers, transmit power level or operator age. The Internet

All international contests have a few web pages where the rules and other helpful information about the contest such, as the results of past years are available. Other web pages provide contest calendars with links to contest rules and other general contesting information. For example: [www.sk3bg.se/contest/index.htm](http://www.sk3bg.se/contest/index.htm) [www.hornucopia.com/contestcal](http://www.hornucopia.com/contestcal) <http://www.ng3k.com/contest/> <http://www.contesting.com/>

### Contest log-keeping

This was once a pen and paper job, but now thankfully most of us have computers that can help us. No matter how big the contest is, or how many contacts you make,

using a computer should make life easier for you and especially the person who has to check and adjudicate your log. Many international contest organisers no longer accept paper logs.

### Logging software programmes

These are the best and simplest way to log your contacts. Logging software programmes have been around for a long time now and they come in two types. General logging programmes that are designed for day-to-day general log keeping and contest logging programmes which are dedicated to contest operating only and which thus contain many useful neat features that general logging programmes don't need and don't have. These programmes will not only keep a log of all your contacts, they will do the scoring for you and at the end of the contest you can save a file of the contacts which can be emailed directly to the contest organisers.

The first contest logging programmes were DOS-based, but now Windows programmes are more popular because they are more user friendly and have more features. N1MM Logger is the most popular Windows programme and is completely free. The programme web-site is [www.n1mm.hamdocs.com](http://www.n1mm.hamdocs.com) Personally I have been using this programme since the first version of this programme was released in 2001 and really recommend it. Two other popular Windows programmes are Writelog and WinTest, but neither of these are free. Various free older DOS type

programmes, such as SD, CT and TRlog are also still available.

### Rig Control

The most basic function of a contest logging programme can be used by merely typing in the callsign and exchange details of each contact as you make them, the programme will take care of the date and times. But the programmes are capable of doing a lot more, when a computer-transceiver connection is used. The programme will be able to key your transceiver and transmit recorded contest exchange information, the programme will always know frequency and mode your transceiver is on and enter these details in the contest log, plus a few more useful tasks and features will become available. This computer-transceiver connection is commonly called 'rig-control'. The connection is usually done via Serial COM port or USB cables, plus for digital modes and SSB modes you may need additional audio receive or transmit or both receive and transmit connections. Most transceivers but not all, need some sort of interface, which can be a simple homebrew one or a commercial one. The N1MM Logger programme Help Files and your transceiver manual will show how these connections are done.

On the following pages, there is a summary list of the New Zealand AR contests, a basic month by month calendar of the more popular international contests, plus the rules for various NZ contests.

## NEW ZEALAND HF AR CONTESTS

Contest	Comments	When – weekends	Sponsor
Jock White Memorial Field Day	A contest and activity event for club & individual FD stations, CW &SSB on 40m & 80m	4th February	NZART
Thelma Souper Memorial	80m, refer WARO column in Break-In for details	2nd April	NZART (WARO)
Kiwi Digital Modes Group RTTY	RTTY on 80m	80m - 3rd Sat April 40m - 4th Sat April	Kiwi Digital Modes Group
Sangster Shield	CW only on 80m only, good contest for QRP & new operators	3rd May	NZART
Memorial	The premier ZL domestic contest, 80m only, CW & SSB	1st July	NZART
Waitakere Sprints	A pair of quick, fun, one-hour contests on 80m	SSB - last Sat July CW - first Sat Aug	Papakura Radio Club
Doug Gorman Memorial Frequency Measurement	Frequency measuring activity on 80m	1st Mon September	Wellington VHF Group on behalf of NZART
Nostalgia Night	An activity evening for old-time radios & their custodians!	1st Sat September	SPAM - Society for the Preservation of Amplitude Modulation
Oceania	Our own premier international HF contest is very well supported by non-Oceania stations	SSB - 1st October CW - 2nd October	Oceania Contest Committee on behalf of NZART and WIA
Straight Key Night	Some back to basics fun	1st Sun November	ZLIAIH
Kiwi Digital Modes Group Twin Sprint	PSK & RTTY on 80m	1st December	Kiwi Digital Modes Group



# RULES FOR 2012 OCEANIA DX CONTEST

## 1. SPECIAL NOTES [check the contest web site for any updates or changes for the 2012 contest]:

- There are some changes to the awarding of certificates in Rule 12, as follows:
  - The requirement to make at least 10 QSOs to receive an award has been abolished.
  - A participation certificate is now being awarded to every station that makes at least one valid QSO.
  - All certificates will be made available on the contest web site at [www.oceaniadxcontest.com](http://www.oceaniadxcontest.com) for entrants to download and print at their convenience.
  - Certificates can be posted but only on request to the Contest Committee at [info@oceaniadxcontest.com](mailto:info@oceaniadxcontest.com) and only to those entrants who won a category in their country and made at least 10 QSOs.
- Only one entry may be submitted by each operator or team of operators (Rule 6).
- All email logs are processed by an email robot. The robot sends an automated email acknowledgement indicating either acceptance or rejection of the log. If you do not receive this acknowledgment, or are encountering difficulty in having the log accepted, then please contact the Contest Committee at [info@oceaniadxcontest.com](mailto:info@oceaniadxcontest.com).
- Electronic logs are to be in Cabrillo format which is now generated by all popular contest logging software programs. Alternatively entrants can use the forms at <http://www.b4h.net/cabforms/> to manually create and submit a Cabrillo file.
- Portable prefixes can now be inserted either front of or behind the home callsign, e.g., W1XXX operating in ZL could sign as ZL/W1XXX or W1XXX/ZL.
- If the station worked does not provide a serial number, then log the received number as 001. See Rule 8. This new provision allows credit for contacts with stations that are not in the Oceania DX Contest.
- A reminder that Single-Op Single Band logs must record ALL contacts made by the station - both on the band chosen for the entry and on any other bands

## 2. CONTEST PERIODS:

PHONE Contest: 08:00 UTC Saturday to 08:00 UTC Sunday, first weekend in October  
 CW Contest: 08:00 UTC Saturday to 08:00 UTC Sunday, second weekend in October

## 3. THE AIM of the contest is to promote HF contacts with stations in the Oceania region (VK, ZL, Pacific Islands and other locations within the IARU "Worked All Continents" Oceania boundary).

## 4. THE OBJECT is for:

- Oceania transmitting stations to contact as many stations as possible both inside and outside the Oceania region.
- Non-Oceania transmitting stations to contact as many stations as possible inside the Oceania region. There is no penalty for working non-Oceania stations but contacts between non-Oceania stations will score no points or multiplier credits.
- Oceania receiving (SWL) stations to copy as many contest stations as possible both inside and outside the Oceania region.
- Non-Oceania receiving (SWL) stations to copy as many contest stations as possible inside the Oceania region.

## 5. BANDS:

160M – 10M (no WARC bands).

## 6. TERMS OF COMPETITION FOR ALL CATEGORIES:

- Only one entry is allowed for each operator or team of operators.
- A different call sign must be used for each entry.
- High power entrants must not exceed 1500 watts total output power, or the maximum permitted output power in their country, whichever is less, on any band.
- QSO alerting assistance (e.g., packet spots) is allowed in all entry categories, but self-spotting, asking other stations to spot you, or any other form of soliciting QSOs is not allowed.
- All of an entrant's transmitters and receivers must be located within a 500-meter diameter circle or within the property limits of the station licensee, whichever is greater. All antennas must be physically connected by wires to the transmitters and receivers used by the entrant.
- Remote operation is permitted. The entry location of a remote station is determined by the physical location of the transmitters, receivers, and antennas. A remote station must obey all station

and category limitations.

## 7. ENTRY CATEGORIES:

- Single Operator Low Power (SINGLE-OP LP): Either All Band or Single Band. One person performs all of the operating and logging functions. Total output power must not exceed 100 watts. Only one transmitted signal is permitted at any time.
- Single Operator High Power (SINGLE-OP HP): Either All Band or Single Band. One person performs all of the operating and logging functions. Only one transmitted signal is permitted at any time.
- Multiple Operators and Single Transmitter (MULTI-ONE): More than one person can contribute to the final score during the contest period. Only one transmitted signal is permitted at any time. A maximum of ten (10) band changes may be made in any clock hour (00 through 59 minutes). For example, a change from 20 meters to 40 meters and then back to 20 meters counts as two band changes. Use a single serial number sequence for the entire log.
- Multiple Operators and Two Transmitters (MULTI-TWO): More than one person can contribute to the final score during the contest period. A maximum of two transmitted signals is permitted at any time on different bands. Either transmitter may work any and all stations. A station may only be worked once per band regardless of which transmitter is used. The log must indicate which transmitter made each QSO. Each transmitter may make a maximum of eight (8) band changes in any clock hour (00 through 59 minutes). For example, a change from 20 meters to 40 meters and then back to 20 meters counts as two band changes. Use a separate serial number sequence for each band.
- Multiple Operators and Multiple Transmitters (MULTI-MULTI): More than one person can contribute to the final score during the contest period. No limit to transmitters, but only one transmitted signal (and running station) allowed per band at any time. Use a separate serial number sequence for each band.
- SWL: Short Wave Listener (Receive Only), All Band.

## 8. EXCHANGE:

RS(T) report plus a progressive contact serial number starting at 001 and incrementing by one for each contact. MULTI-TWO and MULTI-MULTI entries must use a separate serial number starting at 001 for each band. If the station worked does not send a serial number, then the received number is to be logged as 001.

## 9. MULTIPLIER:

The multiplier is the number of different valid prefixes worked. Note that the same prefix may be counted once on each band for multiplier credit.

A prefix is the letter/numeral combination that forms the first part of the amateur call - the same as the CQ WPX contest definition. Examples of valid prefixes are N8, W8, WD8, HG1, HG19, KC2, OE2, OE25, etc. Any difference in the numbering, lettering, or order of the same shall constitute a separate prefix. A station operating from a DXCC country different from that indicated by its callsign is required to sign portable. The portable prefix must be an authorized prefix of the country/call area of operation. In cases of portable operation, the portable designator will then become the prefix. Example: N8BJQ operating from Wake Island would sign KH9/N8BJQ or NH9/N8BJQ. KH6XXX operating from Ohio must use an authorized prefix for the U.S. 8th district (W8, K8, etc.) Portable designators without numbers will be assigned a zero (0) after the second letter of the portable designator to form the prefix. Example: PA/N8BJQ would become PAØ. All calls without numbers will be assigned a zero (Ø) after the first two letters to form the prefix. Example: XEFTJW would count as XEØ. Maritime mobile, mobile, /A, /E, /J, /P, or interim license class identifiers do not count as prefixes.

Special event, commemorative, and other unique prefix stations are encouraged to participate. Prefixes must be assigned by the licensing authority of the country of operation.

## 10. CONTACT POINTS:

Each QSO is credited twenty points on 160M; ten points on 80M; five points on 40M; one point on 20M; two points on 15M; and three points on 10M. Note that the same station may only be counted once on each band for contact points.

## 11. THE FINAL SCORE is the sum of the Contact Points multiplied by the Multiplier (the total number of prefixes worked on all bands, noting that the same prefix can be counted once on each band).

The trophies and plaques in the following table will also be awarded.

Award	Recipient	Sponsor
OCEANIA Ron Wills ZL2TT Memorial Trophy	Top entrant from Oceania in PHONE Single Operator ALL Band category	ZL2GI, ZL2AL, Wellington Amateur Radio Club and NZART
OCEANIA Single-Op ALL Band CW Plaque	Top entrant from Oceania in CW Single Operator ALL Band category	VK3QB
OCEANIA CW Single-Op LOW Power ALL Band Plaque	Top entrant from Oceania in CW Single Operator LOW Power ALL Band category	Pacific DXers
AUSTRALIA Single-Op ALL Band PHONE Plaque	Top entrant from Australia in PHONE Single Operator ALL Band category	VK3VTH
AUSTRALIA Frank Hine VK2QL Memorial Trophy	Top entrant from Australia in CW Single Operator ALL Band category	WIA Federal
AUSTRALIA Club Plaque	Local club from Australia with the greatest number of member stations participating in the Oceania DX Contest	VK Contest Club
ASIA Single-Op ALL Band PHONE Plaque	Top Entrant from Asia in PHONE Single Operator ALL Band category	VK8PDX (ex-VK5HRT)
ASIA Single-Op ALL Band CW Plaque	Top Entrant from Asia in CW Single Operator ALL Band category	W3SE / ZL3TE
NORTH AMERICA Single-Op ALL Band PHONE Plaque	Top Entrant from North America in PHONE Single Operator ALL Band category	N6RO
NORTH AMERICA Single-Op ALL Band CW Plaque	Top Entrant from North America in CW Single Operator ALL Band category	Oceania Amateur Radio DX Group Inc
EUROPE Single-Op ALL Band PHONE Plaque	Top Entrant from Europe in PHONE Single Operator ALL Band category	Oceania Amateur Radio DX Group Inc
EUROPE Frank Vander Drift VK3COF Memorial Plaque	Top Entrant from Europe in CW Single Operator ALL Band category	VK6DXI

Note: Both Low Power and High Power entries are eligible for the Single Operator ALL Band awards in the above table.

12. AWARDS:

Each station must log a minimum of 10 contacts to be eligible for an award.

Certificates will be awarded to the top scoring station in each category listed under Section 7 for each IARU WAC continent and each country. A special participation certificate will be awarded to every station that makes at least 100 QSOs in either the PHONE or CW sections of the contest.

The trophies and plaques in the following table will also be awarded.

Note: Both Low Power and High Power entries are eligible for the Single Operator ALL Band awards in the above table.

Certificates will be awarded to the top scoring station in each category listed under Section 7 for each IARU WAC continent and each country. A participation certificate will also be awarded to every station that makes at least one valid QSO.

The certificates will be made available on the contest web site at [www.oceaniadxcontest.com](http://www.oceaniadxcontest.com) for entrants to download and print at their convenience. Certificates can be posted but only on request to the Contest Committee at [info@oceaniadxcontest.com](mailto:info@oceaniadxcontest.com) and only to those entrants who won a category in their country and made at least 10 QSOs.

Awards may be withdrawn or added at any time, and at the discretion of the Contest Committee. Refer to the Oceania DX Contest web site at [www.oceaniadxcontest.com](http://www.oceaniadxcontest.com) for the latest information about contest awards.

13. GENERAL LOG REQUIREMENTS:

Transmitting entries are to submit a log showing the following details for each contact - band or frequency, mode, date, time in UTC, callsign of station worked, RS(T) and serial number sent, RS(T) and serial number received. SINGLE-OP Single Band logs are to record ALL contacts made by the station - both on the band chosen for the entry and on any other bands. All logs must be submitted in date/time order.

SWL entries are to submit a log showing the following details for each contact - band or frequency, mode, date, time in UTC, callsign of 'station heard', callsign of 'station being worked', RS(T) and serial number sent by the heard station. The same callsign may appear only once in any group of 3 consecutive entries in the 'station being worked' column. Note that in the case of non-Oceania SWL entries, only Oceania callsigns should appear in the 'station heard' column.

All duplicate contacts must be shown - DO NOT delete duplicate contacts. No penalty will be applied for showing duplicate contacts.

14. ELECTRONIC LOGS are preferred and are compulsory for stations logging more than 50 contacts.

Electronic logs are to be submitted in Cabrillo format. The Cabrillo log file must include an accurately completed header (containing the summary information) and the QSO log data. All

of the fields in the Cabrillo header must be completed except for the ARRL Section, Category Overlay and Soapbox lines. Failure to fill out the header correctly can result in the entry being placed in the wrong category or reclassified as a check log. See [www.oceaniadxcontest.com](http://www.oceaniadxcontest.com) for the latest information on the Cabrillo log format requirements.

The log file name is to be in the form `callsign.log`, for example, if ZL2WB submits a log file - then it should be named `zl2wb.log`.

Send the log file as an e-mail attachment to [ph@oceaniadxcontest.com](mailto:ph@oceaniadxcontest.com) (for PHONE entries) or [cw@oceaniadxcontest.com](mailto:cw@oceaniadxcontest.com) (for CW entries). Please insert only your callsign in the Subject field of the e-mail used to send your Cabrillo log. The log file must be sent as an attachment, not as text or other content within the e-mail message. Do not zip the log file and only include one log in each email submission.

All incoming email log messages are processed by an email robot. The robot sends an automated email acknowledgement indicating either acceptance or rejection of the log. If you do not receive this acknowledgment, or are encountering difficulty in having the log accepted, then please contact the Contest Committee at [info@oceaniadxcontest.com](mailto:info@oceaniadxcontest.com).

Note: SWL files cannot be processed by the robot so please forward all electronic SWL files to [info@oceaniadxcontest.com](mailto:info@oceaniadxcontest.com).

Entrants using paper logging, or logging software that does not produce a Cabrillo file, are encouraged to use the on-line forms at <http://www.b4h.net/cabforms/> to manually create and submit a Cabrillo file.

15. PAPER LOGS:

Electronic Logs are preferred (see Rule 14 above) but if this is not possible then paper logs in the Oceania DX Contest format may be submitted, provided they contain less than 50 contacts. Each paper log is to be accompanied by a summary sheet that clearly states

The station's callsign Operator callsign/s Entrant's name and mailing address (for receipt of awards) Mode and Category entered Contact points claimed on each band Number of multiplier prefixes claimed on each band Total claimed score

Official log sheets and summary can be downloaded from the Oceania DX Contest web site at [www.oceaniadxcontest.com](http://www.oceaniadxcontest.com). If you do not have access to the official forms then you may make your own in accordance with the general requirements outlined above and in Section 13.

Paper logs are to be posted to: Oceania DX Contest, c/o Wellington Amateur Radio Club Inc., PO Box 6464, Wellington 6030, New Zealand. Only one entry is to be included in each submission. Airmail is preferred if you are submitting a log from outside VK or ZL.

16. DEADLINE:

All logs must be emailed or postmarked NO LATER than 6 November 2012. [Check contest web site for changes to this date].



The reception of logs will be acknowledged by the email robot (for electronic submissions) and a listing of all logs received by the robot will be posted on the Oceania DX Contest web site at [www.oceaniadxcontest.com](http://www.oceaniadxcontest.com).

#### 17. DISQUALIFICATION:

Violation of amateur radio regulations in the country of the contestant or the rules of the contest; unsportsmanlike conduct; or taking credit for excessive unverifiable QSOs or multipliers will be deemed sufficient cause for disqualification. Incorrectly logged calls will be counted as unverifiable contacts. ANY entrant that uses means, other than contacts on the permitted bands and modes, to SOLICIT, ARRANGE, or CONFIRM any contacts during the contest is unsportsmanlike and the entry will be subject to disqualification.

#### 18. DECLARATION:

Although no signed declaration is required, by submitting a log you are deemed to have agreed that: 1) you have read and understood the rules of the contest and agree to be bound by them, as well as all rules and regulations of your country which pertain to amateur radio, 2) your log entry may be made open to the public, and 3) all actions and decisions of the Oceania DX Contest Committee are official and final.

#### 19. FURTHER INFORMATION:

The latest information about the contest will be published on the Oceania DX Contest web site at [www.oceaniadxcontest.com](http://www.oceaniadxcontest.com). Any questions can be emailed to [info@oceaniadxcontest.com](mailto:info@oceaniadxcontest.com) or posted to Oceania DX Contest Committee, c/o PO Box 21088, Little Lonsdale Street, Victoria 8011, Australia.

## JOCK WHITE MEMORIAL FIELD DAY CONTEST

This annual contest is named to honour Jock White ZL2GX, NZART Contest and Awards Manager for over 40 years, for the service that he gave to NZART during that time. This contest, like many others, results from Jock's initiatives. Home stations are now valid contacts in this contest and are encouraged to have a minimum of 50 phone or 25 CW QSOs and to submit a log entry. The minimum numbers apply to the band being used or 50 and 25 on each band if on both bands. This contest is primarily to test Branch organisation and weld a team of workers together. There is work for all members — XYL's, OM's, YL's and SWL's.

#### Of Special Significance:

1. The term "Branch Points" replaces the more common term "multiplier" in these rules.  
Refer rule 14.2. There is no change in concept, just a name change.
2. The minimum number of contacts for a field station to qualify as "Branch" points for other stations is 50 on Phone or 25 on CW. Refer rule 14.2.4.
3. Restrictions applying to the use of linear amplifiers are given in rule 7.1. Complaints about the use of linear's will be investigated.
4. Team leaders should ensure that all of the team understands the rules and that newcomers are assisted with their operating technique.
5. Stations should be operated within the amateur "codes" as regards procedures, equipment, operating speeds etc.
6. Have you considered entering the QRP section?
7. Rule 15.4 has been amended so that signing of logsheets by the operator is not compulsory. This has been changed because of difficulties in doing this with computer logging. However, it is essential that the operators check the log after their period of operation.
8. Rule 16.2.2 has been amended to include email address alongside of certificate address. Results can be sent to the email address given.

#### Rules

1. **WHEN:** The last full weekend in February each year: Saturday 0200 — 1100, 1700 — 2400 UTC. (1500 — 2400 NZT) Sunday 0000 — 0200 UTC (0600 — 1500 NZT).
2. **Bands:** 40 and 80 metres.
- 2.1. Simultaneous operation on 80 and 40 metres is permitted provided that only one receiver/transmitter is operational on any one band at any one time. Single receiver/transmitters may be used on one or both bands.
3. **Modes and Contacts:**
- 3.1. Modes to be used are phone and CW. Phone to CW contacts are not permissible.
- 3.2. Home stations will identify themselves as such and field stations will identify themselves as such.
4. **Sites/Shelter:** All equipment (except generators) to be under the same shelter. For field stations the shelter to be a tent (one or more tents within 10 metres of each other) erected on the weekend of the contest, mobile home or other vehicle (moved on to the site on the weekend of contest).
5. **Antennae:** for field stations to be raised no earlier than 2300 UTC on the Friday (1200 NZT on the Saturday). This takes into account that some may chose to erect antennae supports while others may use natural or standing supports. eg. hills, trees, towers, buildings etc.

6. **Power:** for field stations must be from a source independent of the AC or DC mains, ie. all power must be from batteries/ engine alternator/vibrator/solar source/wind generator etc.

7. **Contest Sections:** One section of the contest may be entered by any one station although that station may qualify for more than one section.

7.1. Open sections: The maximum output power from the transmitter final amplifier must not exceed the legal limit given in the Radio Regulations. Linear amplifiers may only be used to increase the power output of low power transmitters (eg 5 – 30 Watts) to the equivalent of a typical transmitter (ie nominal 100/150 Watts). These sections are for stations in the appropriate region or category. The trophies stated will be awarded to the highest scoring station in the section. Certificates will be issued to the winners of each section plus place getters as warranted by entry numbers.

#### Field Stations

- 7.1.1. Northern Region Section (Montgomery Cup)
- 7.1.2. Central Region Section (Patea Shield)
- 7.1.3. Midlands Region Section (ZL3/4 Trophy)
- 7.1.4. Southern Region Section ('4 Trophy)
- 7.1.5. Single Operator Section – operation unaided by any other person.
- 7.1.6. CW Only Section – operation on either band or both bands CW only.
- 7.1.7. Phone Only Section – operation on either band or both bands phone only.
- 7.1.8. Other Power Section – power source solar, wind generator, water etc.
- 7.1.9. 80 Metres Only Section – operation on 80 metres only.

#### Home Stations

- 7.1.10. Northern Region Section
- 7.1.11. Central Region Section
- 7.1.12. Midlands Region Section
- 7.1.13. Southern Region Section
- 7.1.14. Overseas Section.

A certificate will also be awarded to the overall highest scoring home station.

7.2. QRP Section (W M Hall Memorial Cup): The maximum output power from the final amplifier of the field station must not exceed 5 watts.

8. **Operators.** The station should be operated by members of NZART except that operators being introduced to NZART and helpers need not be members. Indicate accordingly on the summary sheet.

9. **Mobile Stations:** are eligible for contest purposes as field stations for contacts made from within one branch area only. The branch number used will be that of the area where the station is operated.

#### 10. Exchanges:

- 10.1. The exchange should consist of report and serial number/ branch number. eg. 59001/11 on phone and 599001/11 on CW.
- 10.2. Serial numbers will commence at 001 and increment by one for each contact.
- 10.3. Where simultaneous operation is used a separate serial number series will be used for each band.
- 10.4. Phone and CW numbers on one band are from the same number series.

11. **Branch Number:** is the NZART Branch number for the area in which the field station is operated except that stations may move

a few kilometres from their home area to a suitable location. eg. city to country. Home stations will use the Branch number 00.

- 11.1. If the field station chosen location is within another Branch area care must be taken not to clash with the other Branch station. The onus is on the 'moved' station to ensure that there is no clash.

- 11.2. The Branch number of Branches in recess may be used.

## 12. Contest Periods:

- 12.1. There will be 18 periods between the even hours. eg. 1500 – 1600, 1600 – 1700, etc.

- 12.2. Contacts may be made with any field, ZL home or 'overseas' (refer rule 13) station once each period on each mode on each band. ie. on 80m: once on phone and once on CW, and on 40m: once on phone and once on CW, each period.

- 12.3. The contacts with any one station on phone and CW on one band in a period, or on one mode at the end of one period and commencement of the next, may not be sequential except where 5 minutes have elapsed between those contacts.

13. **"Overseas" Stations:** are those located outside the New Zealand mainland, and in the South Pacific region. The prefixes that are eligible are: all VK, ZL5, 7, 8, 9, A3, FK, FO, FW, H4, P2, YJ, 3D2, 5W.

14. **Scoring:** The final score will be the total of contact points (80m + 40m) x total Branch Points.

- 14.1. Contact points:

ZL phone 3 per contact

ZL CW 5 per contact

Overseas phone or CW 10 per contact

- 14.2. Branch Points (multiplier):

- 14.2.1. One Branch point is claimed for each Branch contacted on each band and mode. eg. one Branch point for contacting Branch 01 on 80 m phone, two Branch points for contacting Branch 01 on 80 m Phone and 40 m Phone or 4 Branch Points for contacting Branch 01 on 80 m Phone and CW plus 40 m Phone and CW, etc. Enter one callsign in the appropriate summary sheet and total the columns to get a Branches number for summary sheet one.

- 14.2.2. Only one station from a branch may be claimed as a Branch point for a mode on one band. However, where a Branch has more than one station active different stations contacted may be claimed for the other band or mode.

- 14.2.3. Stations using the same Branch number may contact each other for contact points but not for Branch points.

- 14.2.4. To qualify as Branch points for other stations, a field station must have a minimum of 50 contacts on Phone or 25 contacts on CW on each band that the station is active on. eg. if active on 80 m Phone, must have 50 contacts to count as one Branch point, if active on 80m Phone and CW, must have 50 contacts on phone and 25 contacts on CW to count as two Branch points, etc.

## 15. Logs

- 15.1. One log per station in order of time, except that where simultaneous operation is used one log per band is required.

- 15.2. Head each page with the call, Branch or HS for home station and the page number.

- 15.3. Log sheet layout order: date/time/station contacted/CW or PH/ band/exchange sent/exchange received. NZART log sheets are preferred. Entry in the points column is not required as totals are done from a summary, but the points column can be used for checking purposes. A total of PH/CW/DX contacts on each page is useful for counting purposes.

- 15.4. Use a separate logsheet per period, except that where there are very few contacts per period, several periods (ruled off between periods) can be on one sheet.

- 15.5. Highlight or underline each contact claimed as a multiplier.

- 15.6. Check for accuracy and rule through any duplicate contacts in a period.

## 16. Summary.

- 16.1. The summary and final score details are to be on the 'Jock White Memorial Field Day' summary forms provided to Branch secretaries each year and also available from NZART HQ and the NZART website <<http://www.nzart.org.nz/nzart/update/contests>>.

- 16.2. Summary Sheet 1 contains:

- 16.2.1. Callsign used Branch name & number or HS for home station

- 16.2.2. Postal address for certificates and email address for results

- 16.2.3. Section entered (one only)

- 16.2.4. Names & Calls of operators/assistants

- 16.2.5. No. of 80 m phone contacts

- No. of 80 m CW contacts

- No. of 80 m overseas contacts

- 16.2.6. No. of 40 m phone contacts

- No. of 40 m CW contacts

- No. of 40 m overseas contacts

- 16.2.7. Calculation of contact points

- 16.2.8. Branch points claimed for 80 phone

- Branch points claimed for 80 CW

- Branch points claimed for 40 phone

- Branch points claimed for 40 CW

- Total Branch points

- 16.2.9. Total points claimed (contact points x total Branch points)

- 16.2.10. List transceivers/generator etc/power output

- 16.2.11. Certification of power output and rule observance by two operators (except for single operator stations)

- 16.3. Summary Sheets 2 and 3 contain a table for listing the CALLSIGN of the station claimed as a Branch point for each branch on each band and mode. Count the number in each column and transfer the figure to summary sheet 1.

17. **Closing Date:** Logs should be posted to reach Stuart Watchman, 33 Brooklyn Drive, Blenheim by the Saturday which is four weeks after field day Saturday. eg. If Field Day is held February 23/24, logs to be received by 24 March (in a non – leap year). Late logs will not be eligible.

# NZART MEMORIAL CONTEST

To commemorate those New Zealand amateur radio operators who lost their lives in World War 2.

## 1. When:

First weekend in July, 2000 – 2300 NZST Saturday and Sunday. Three one-hourly operating periods each evening.

## 2. Bands:

80m only – A station may be contacted twice during each operating period – once on phone and once on CW provided that contacts are not consecutive.

## 3. Operator Categories:

Single-operator CW only, Phone only, or both CW & Phone and SWL

## 4. Exchange:

RS(T) report plus a three digit serial number starting at 001 for the first contact and incrementing by one for each subsequent contact.

## 5. Scoring:

### A. Contact points:

Phone - One point per contact

CW - Two points per contact

### B. Multipliers:

Each different callsign prefix worked, Phone and CW is a

multiplier. (eg. a ZL4 worked on both Phone & CW counts as two multipliers).

## C. Scoring:

The final score is the sum of the contact points multiplied by the number of different multiplier prefixes worked.

## 6. Logs:

The official log sheets can be downloaded from NZART web site and are also available from the NZART Business Manager. Logs must show contacts in correct order of time. Do not group all ZL1, ZL2, ZL3 etc. contacts together.

## 7. Summary Sheet:

A separate summary sheet, also available from the NZART web site, must be completed and attached to the log sheets. This must show the following:

- A. Callsign of station and NZART Branch of which a member.

- B. Name and full address of operator.

- C. Section in which competing:

- Open phone and CW (Memorial Trophy),

- Open CW only (Auckland CW Cup),

- 'Beginners' CW only (Laing-Smith Cup). Competitors in this



section must state the number of their operator's certificate and the date of issue,

- Low power phone and CW (Mannell Trophy),
  - Home-made SSB equipment (Brother John Rodgers Plaque),
  - Phone only (Phil Armstrong Plaque),
  - Listeners section: Rules as for the transmitting sections except that only the exchange sent by that station heard should be given. The callsign of the station heard and also of the station being 'worked' must be stated.
  - Australian section: Rules as for the Open section.
- D. Brief description of equipment used and power output.
- E. Points Summary:

CONTACTS		CONTACT POINTS	NUMBER OF PREFIXES	CLAIMED SCORE
PHONE	X1=			
CW	X2=			
TOTALS		X	=	

Plus a list of prefixes worked

- F. Signed declaration that the contest rules and Radio Regulations have been observed.

#### 8. Log Submission:

Logs are preferred as email attachments in either Word, Excel or even plain Text format and should be sent to 2bfrank@orcon.nz  
Paper logs and summary sheets should be sent to NZART Contest Manager, Frank Hunt ZL2BR, 8 Manu Crescent, New Plymouth 4310. Logs should arrive no later than four weeks after the contest date.

## NZART SANGSTER SHIELD CONTEST

Presented to the amateurs of New Zealand by Mr R. Sangster in 1927, the Sangster Shield is for annual competition to be won by the most efficient station. In this respect it should be pointed out, that in addition to the efficiency of the equipment used, the efficiency of the operator is of the utmost importance. To win this contest marks an operator as one who not only knows how to obtain the most effectiveness from low power but also one who is most proficient in the art of telegraphic communication.

#### Rules

##### 1. When:

Third full weekend of May each year, between the hours of 2000 NZST and 2300 NZST on each evening. The maximum period of operation will be six hours.

2. **Power:** To compete for the Sangster Shield and Trophies the output of the transmitter must not exceed 5 Watts.

3. **Mode:** CW only

4. **Band:** 80 m only

- To give QRP contestants a fair chance (particularly with DX stations) higher power stations are requested to operate above 3530 kHz

##### 5. Exchange:

- RST followed by branch number followed by power output – eg 569/11/04. indicating a 569 report; branch 11; and power of 4W. Power will always be given as two figures: over 100W will be given as 99, while below 10W will be preceded by 0.
- Overseas stations are required to give RST plus a serial number beginning at 001.

##### 6. Contacts:

- Valid contacts are those between two ZL stations or between ZL and overseas stations, contacts between two overseas stations are invalid.
- QSOs with any one station are permitted once only each half hour, based on an "even half hour" basis, eg 2000 to 2030, 2031 to 2100 etc.
- It is not permissible to claim QSOs with the same station "twice running", i.e. at the end of one half hour period and at the beginning of the next, unless a different station is contacted by one of the two stations between QSOs, or a time delay of at least five minutes elapses between QSOs.

##### 7. Entrants:

All ZL entrants must be financial members of NZART, except for first time entrants qualifying for the Transistor Trophy.

##### 8. Logs:

- A4 size paper – preferably NZART log sheets.
- Data in this order: Date, Time, Station Call-sign, Exchange Sent, Exchange Received, Points Claimed.
- On a separate sheet a summary to show:
- Entrant's callsign, name and address in BLOCK LETTERS.
- Number of contacts with stations using 5W or less.
- Number of contacts with stations using 6W or more.

- Number of contacts with overseas stations.

- List of different branches worked with the number and name of each branch as given in the Call Book (in branch number order) plus the callsign of the station claimed for that branch.
- Total score – (total points multiplied by the number of branches worked).
- Description of equipment, antenna and output power used.
- Signed declaration that all contest rules have been observed.

##### 9. Scoring:

For ZL stations:

ZL to Overseas – 10 points

ZL to ZL with Power given as 5 W or less – 5 points.

ZL using 5W or less to ZL with Power given as 6W or more – 1 point

ZL using 6W or more to ZL with Power given as 5W or less – 1 point

ZL using 6W or more to ZL with Power given as 6W or more – not permitted for contest purposes.

##### For Overseas stations:

Overseas using 5W or less to ZL with Power given as 5W or less – 10 points.

Overseas using 5W or less to ZL with Power given as 6W or more – 5 points.

Overseas using 6W or more to ZL with Power given as 5W or less – 5 points.

Overseas using 6W or more to ZL with Power given as 6W or more – not permitted for contest purposes.

##### 10. Final score:

Total points multiplied by the Number of Branches worked. Note: Contacts with a Contestant's own Branch are OK for points but are not to be counted as a multiplier.

##### 11. Mobile or Mobile/Portable operation:

Will be permitted for New Zealand stations, however, the station must be operated from one location each evening. This means a station could operate from one location the first evening and another location on the second evening. The station must use the Branch number applicable to its location at the time. The entrant may combine both logs for contest purposes, but the logs must indicate their locations on both evenings. In this case then only one branch (either) is to be eliminated as an "own Branch" multiplier.

Overseas Stations may be mobile or portable, but a maritime mobile station must be outside New Zealand's territorial waters to be counted as a DX contact.

##### 12. Discounted Contacts:

It is expected that participating stations will provide a fair chance for all entrants to make contact with them. While it is not intended to discourage contestants from operating only part of the full contest it is considered that at least 20 contacts should be made and station operation should be over at least three half-hour

operating periods. Stations considered to have worked less than this requirement will have their contacts and branch multiplier contribution deducted from contest logs.

13. Awards:

- Sangster Shield: to the highest scoring entrant using 5W or less and observing the rules as enumerated. (Note that all first time entrants qualifying for the Transistor Trophy will also be eligible for the Sangster Shield Award)
- Transistor Trophy: to the highest scoring entrant using 5W or less and observing the rules as enumerated, but in addition who has been licensed for 12 months or less. Entrants must give Operator's Certificate number together with date of issue.
- Arthur Stevens Trophy: will be presented to the highest scoring South Island entrant using 5W or less. (This trophy is in honour of Arthur, formerly ZL1MT, a very long time stalwart of the Sangster Shield Contest).

- Certificates to the first three entrants using 5W or less, also to the first three "newly licensed" entrants qualifying for the Transistor trophy.
- Certificate to entrant using 6 W or more with the highest score.
- Certificates to Overseas entrants with the highest score in their respective call areas.
- Certificate to the branch with the highest aggregate score from three entrants operating in the QRP section. A minimum of three entrants are required to be eligible for this section. The top three scoring entrants for any Branch will automatically be aggregated – it is not necessary for a Branch to send in an entry for this section.

14. Logs:

Must be posted to reach the Contest Manager, Glenn Kingston ZL2KZ, 53 Tannadyce Street, Wellington 6003, on or before the third Thursday of June.

# WAITAKERE SPRINTS CONTEST

The Papakura Radio Club Inc. is pleased to announce that the Waitakere Sprints will continue. The Sprints will be the same as previously held, the Phone Sprint will be on the last Saturday in July and the CW Sprint will be on the first Saturday in August. The Sprints are of one-hour duration on 80m, and are open to all licensed amateurs in ZL, VK and Oceania call areas.

**Object of the Sprints:** The operator's basic goal in the sprints is to make as many contacts as possible, without duplication, during an hour of operation on a single band. Any contact with ZL, VK or Oceania stations on 80m during the contest period can be counted, but a station may be claimed only once.

**Eligibility:** The Waitakere Sprints are open to all licensed amateurs anywhere in the ZL, VK and Oceania call areas. SWL logs will also be welcome. Contest Periods:

Phone 1000 to 1100 UTC, on fourth Saturday in July  
CW 1000 to 1100 UTC, on first Saturday in August

Frequencies  
Phone: 3.550 to 3.700 may be used.  
CW: 3.500 to 3.550 may be used.

**Power:** In fairness and consideration to others NO LINEAR AMPLIFIERS are to be used during the contest.

**Contest call:** CQ Contest, CQ Sprint or CQ Test.

**Awards:** Certificates will be awarded to the overall winner and to the best score in each ZL call area and to the best three scores from VK/ Oceania.

**Special Award:** To encourage contestants to enter both Sprints we have decided to issue a Special Certificate to the entrant with the Highest combined score. The method of calculation will be: (Phone points + CW Points) x 2. All logs received will be considered for this award. To qualify for the multiplied points each log must contain a minimum number of valid contacts. ie. Ten (10) for Phone and Five (5) for CW.

**Logs:** A separate log must be submitted for each Sprint and must be clearly marked PHONE or CW. Contest logs must show for each

contact:- Date, Time, Callsign of station worked, Signal report and serial number sent, Signal Report and serial number received. SWL logs must show both Callsigns in the QSO also both Signal Reports and serial numbers. Logs are to be in the hands of the Manager, Waitakere Sprint by 1 September.

Sample Log

Date	Time	Station Worked	Report and Serial Sent	Report and Serial Received	Points

Postal address: Manager Waitakere Sprint, PO Box 72 397, PAKAKURA 2244

Email is the preferred method of log receipt. A Plain text file named (yourcallPh.txt or yourcallCW.txt) with a tab or space between each column. Email to prc@ihug.co.nz An email confirming receipt of logs will be sent as logs are received.

Closing Date For Logs: No later than 1st September.

Operator Information: Each log must show the following details: Mode, Callsign, Name, Address, Operating area (Eg. ZL1,ZL2,VK, Oceania), Total Number of contacts claimed

A declaration that the operator has abided by the rules and spirit of the contest. Any entry which is clearly in violation of the rules or spirit of this contest or which contains an excessive number of duplicate contacts (this does not refer to duplicates which have been indicated as such and are not claimed) may be disqualified. The decision of the Waitakere Sprint Manager in respect of interpretation of these rules, the granting of awards and disqualifications will be final and no correspondence will be entered into.

# PART STRAIGHT KEY MONT

Polish and lubricate that old morse key and enjoy an evening of old time radio fun. An activity night in which everyone can be a winner with a certificate to prove it.

When: First Sunday in November 2000–2300 NZST.

Band: 80 m (3.5 MHz) only.

Mode: CW sent with straight key i.e. characters formed manually, no system of automatic dots, dashes or spacing permitted.

Divisions: Vintage QRP, Vintage QRO, Open QRP, Open QRO.

Explanation: Vintage: Receiver and transmitter or transceiver using valves, no solid state devices in the signal line permitted. QRP: 5 watts or less RF output.

Exchange: RST/QTH/operator's name (one word)/key used (e.g. ZC1, P&T)/TX type (eg ZC1, FT1000, homebrew)/TX power (watts). Except for DX stations (i.e. non ZL mainland) only RST, operators name, and QTH need be exchanged.

Scoring: 1 Point per QSO. Stations may be worked once, CW to CW only. All stations submitting logs must use a straight key throughout, but straight key stations may QSO stations using bugs, electronic

keyers or keyboards.

Multipliers: Multiply total points as follows: Vintage QRP x2, Open QRP x1.5, Vintage QRO x1.2, Open x1.

Logs: Each log QSO entry to show: Time (NZST or Z ), callsign, RST, QTH, name, key type, Tx type, Tx power (of station worked). Calculate total score, multiply to give total score claimed. Logs to have associated data sheet giving entrant's: name, call-sign, QTH, age (optional), full description of equipment used, ie. key, Tx/Rx, Tx power, antenna.

Send logs by email, mail, fax, on or before November 20 to: Ken McCormack ZL1AIH, 181 Ararimu Valley Road, Waimauku, Auckland or E-mail address <zl1aih@xtra.co.nz>.

Certificates will be sent to the top three stations in each Division (including DX entrants who send in logs). All other entrants will receive a personalised certificate if an A4 self-addressed envelope is sent to the Straight Key Night manager. Any photos of operators and/ or equipment gratefully received.



## NOSTALGIA NIGHT CONTEST

Haul out that old equipment, dust off the cobwebs, check it over and join in a night of nostalgia and fun. This year's contest will be in three sections, catering for the varied interests within the old equipment ranks.

### 1. QRP

### 2. Military

### 3. Open

The overall winner shall be the entrant having the highest points score which will be published in the following Break-in.

#### WHEN:

Second Saturday each September

Four operating periods – each half an hour

Local ZL time:

1930-2000 hrs

2000-2030 hrs

2030-2100 hrs

2100-2130 hrs

#### EQUIPMENT:

Any rig of the past that uses thermionic valves, be it home made, of military origin, commercial or amateur, no solid state or ssb type equipment is acceptable for this event.

#### CYPHER:

RS(T) Plus branch number.

#### POINTS:

Three points for AM phone to AM phone QSO. Six points for CW to CW QSO. Only AM and CW contacts are valid for this competition.

#### MULTIPLIER:

Each NZART branch worked (e.g. Ten branches worked overall and thirty contacts:  $10 \times 30 = 300$ , not 10 branches each period)

ZL1 to ZL3 or ZL4 or reverse multiply by 1.2

ZL2 to ZL4 or reverse multiply by 1.2

#### TOTAL POINTS:

QSO points multiplied by number of branches.

BUT

1. QRP section-if your rig is 5w or less input, then multiply your score by 1.5

2. If your rig is of military origin i.e. ZC1, ARC5, 19 SET, then multiply your score by 1.2

3. Open section – if your rig is other than 1 or 2 but within the power limit no multiplier (the power limit is the legal power limit). BUT

Only one multiplier may be chosen (e.g. military OR QRP – not both).

Repeat QSOs:

These are permitted each operating period on phone and cw, but no consecutive contacts with the same station.

#### LOGS:

Send to: Nostalgia Contest, Mike Digby-Smith ZL1MDS, 6 Baird Ave, Te Kauwhata within seven days with the following data

1. Number of QSOs on CW.

2. Number of QSOs on AM phone

3. Number of different branches worked

4. Score claimed (points x branches).

5. Overall score claimed (points in 4 multiplied by section 1 or 2 as applicable)

6. Details of equipment used for the event.

7. Any comments about event or suggestions

8. Do not send a copy of your log or contacts just the above information.

9. Have a lot of fun on the night.

Mike Digby-Smith ZL1MDS miked@south.net.nz & Barrie Vivian ZL2LA

## BOAT ANCHOR SPRINT RULES

This is in two sections:

**Section 1:** Old radios – all valves – i.e. ZC1, 19 set, Heathkits, any home brew set, but must have all valves.

**Section 2:** Any Hybrid transceiver (must have valve finals i.e. FT200, FTDX400/401, Drake, FT 101s, etc.

Amplitude Modulated signals only.

The overall winner shall be the entrant having the highest points score which will be published in the following Break-in.

#### WHEN:

The second Saturday each February, April, June, August, October.

One operating period Local ZL time: 2000 to 2100 hrs

#### CYPHER:

RS

#### POINTS:

One point for phone to phone QSO. No repeat QSO's:

Stations may be worked a maximum of once on AM phone.

There will be no multipliers.

#### LOGS:

Send to: Boat Anchor Sprint, Mike Digby-Smith ZL1MDS, 6 Baird Ave, Te Kauwhata within seven days with the following data

1. Number of QSO's

2. Overall score claimed

3. Details of equipment used for the event.

4. Any comments about event or suggestions

5. Do not send a copy of your log or contacts just the above information.

6. Have a lot of fun on the night.

## NZART DOUG GORMAN MEMORIAL FREQUENCY MEASURING CONTEST

#### When?

First Monday in September at 0915 UTC (2115 NZT).

1. Listen to ZL6A on approximately 3900kHz for instructions on the frequencies that will be used and the procedure to be adopted. All instructions will be given by ZL6A.

2. Read each frequency as accurately as possible. To qualify for an award it is essential to read each of the three frequencies.

3. Post your entry to: Doug Gorman Frequency Measuring Contest, NZART, PO Box 40-525, Upper Hutt.

4. Entries should be sent within seven (7) days, together with details of equipment used and which section entered (eg, John McKim Cup or Norm Edwards Shield).

#### 5. Judging

The degree of accuracy will be judged by subtracting your readings from the official reading. The resultants will be averaged to arrive at a final degree of accuracy.

#### 6. Awards

6.1. John McKim Cup for those using simple direct reading type

of equipment such as a receiver using a calibrated dial or LED readout to one decimal place, ie 3900.0 kHz. A simple heterodyne type frequency meter (BC221/LM10, etc), whether commercial or homemade.

6.2. Norm Edwards Shield for those using "sophisticated" equipment which might include receivers with LED readout to two or more decimal places (ie, 10 Hz or better). Computer, oscilloscopes, audio generators, etc, used singly or in combination, whether commercial or home made.

6.3. Branch Award certificate to the branch with the lowest average of the three best competitors. If you wish to support your Branch, state you Branch number and name on your entry form.

6.4. Certificates to all those whose average deviation is 200 Hz or better. If you make readings during this activity, but do not wish to have your results published, please drop us a line so we know how many people were interested.

de Neil ZL2TNG and Gavin ZL2ACT



# Doug Gorman Memorial Frequency Measuring Contest Entry Form

Name \_\_\_\_\_ Call-sign \_\_\_\_\_ Branch \_\_\_\_\_

Details of all equipment used:

Make \_\_\_\_\_ Model \_\_\_\_\_

Comments \_\_\_\_\_

Section entered (please tick):

☐ John McKim Cup ☐ Norm Edwards Shield ☐ Branch Award

Measured Frequencies:

1. \_\_\_\_\_ kHz 2. \_\_\_\_\_ kHz 3. \_\_\_\_\_ kHz

Post entry to: Frequency Measuring Contest, NZART, PO Box 40-525, Upper Hutt



## VHF-UHF-SHF CONTEST RULES

*These are the rules for VHF-UHF-SHF Contests, as administered by the Wellington VHF Group. A PDF edition (130K) is also available at <http://www.vhf.org.nz/pubs/Contests/VHF-UHF-SHF-ContestRules-February2010.pdf>. Rules effective from February 2010.*

### CLAUSE 1. Contest dates

#### DX Weekend Contest

All bands 50 MHz and up. First Saturday in February, and the following day.

#### Low Band Contest

All bands 50 MHz to 440 MHz. First Saturday in April, and the following day. Delayed one week if it clashes with VHF Convention, or Easter.

#### Hibernation Contest

All bands 50 MHz and up. First Saturday in June, and the following day. Delayed one week if it clashes with NZART Conference.

#### Brass Monkey Contest

All bands 50 MHz and up. First Saturday in August, and the following day.

#### Microwave Contest

All bands 614 MHz and up. First Saturday in October, and the following day.

#### Field Day Contest

All bands 50 MHz and up. First Saturday in December, and the following day.

For all contests, the operating periods are 1700 to 2300 on the Saturday, and 0700 to 1300 on the Sunday, NZ local time.

### CLAUSE 2. Definitions

**QRP** shall mean a transmitter operating at an output power of 5W or less.

**A Field Station** is one where all equipment, including power sources, antenna systems and operating shelters are taken to the site, and no other facilities are used.

**Light.** Electronic signal generation, modulation and detection, shall be used on all bands, including between 400 THz and 750 THz (light).

### CLAUSE 3. Crossband or repeater contacts

Crossband contacts, or contacts through repeaters, are invalid in these contests.

### CLAUSE 4. Time

All contest periods begin and end on the hour. Use time signals from a reliable source.

### CLAUSE 5. Operation site

Stations may use only one site for the duration of the Contest, but may move to shelter within one kilometre. Any greater move requires a scoring restart. Two, or more, stations in close proximity may only participate if the stations are erected and operated entirely independently throughout the Contest.

### CLAUSE 6. Teams

Team operation is advisable on field sites, for safety. No member of a team that has set up and operated a station may earn points for that station by making contact with that station.

### CLAUSE 7. Call-signs

Only one call-sign may be used by a station for the duration of the Contest.

### CLAUSE 8. Repeat contacts

No station may be worked twice in a period on the same band, nor may consecutive contacts be made on that band to the same station, bridging a period change, unless the other station has worked a third station, if available, in the interim. There shall be a period of, at least, 5 minutes between contacts, if a third station is not available.

### CLAUSE 9. Contact Serial Numbers

Contacts must be fully two-way. Serial numbers must be correctly exchanged and acknowledged, before points may be claimed. The serial number is made up of RS(T) plus a three digit number.

### CLAUSE 10. Station location

Location details of contesting stations must be exchanged on first contact with each new station, especially if mobile, and entered into



the log. Stations shall give their location as latitude and longitude, using the NZ1949 Geoid, to within five minutes resolution or full Maidenhead Locator. As the full Maidenhead is only accurate to 7 km, station location shall be given to within 30 seconds resolution, approximately 0.9 km for contacts above 2.4 GHz. "Christchurch" or "Home station" is an insufficient description. The station giving the insufficient description will be penalised.

#### CLAUSE 11. Logs

Contest logs must reach the VHF/UHF/SHF Contest Manager, Wellington VHF Group, PO Box 12-259, Thorndon, Wellington, within two weeks of the contest, and must contain:

- (a) A certificate signed by the chief operator, stating that the station was operated in accordance with the Radio Regulations and these contest rules.
- (b) A list of all operators and call-signs.
- (c) The station call-sign and operating site, accurately described. Please include an email address for correspondence and a postal address for certificates.
- (d) Power of each transmitter used.
- (e) Optional supplementary information on conditions and/or equipment used, for publication. This is of value to other contestants, and to the contest organisers.
- (f) Separate log sheets for each contest section, in each band, single-sided, showing the following:
  - (i) Heading, showing Section, Band, Contest, Date.
  - (ii) Time and (other) station call-sign, for each contact.
  - (iii) Serial numbers exchanged.
  - (iv) Other station location (first contact).
  - (v) Distance in kilometres to other station.
  - (vi) Claimed score for each contact.
  - (vii) Running score per sheet, total for band, with any bonus points. Each section, on each band, is a mini-contest, please log them that way.
- (g) An email address for results, if you don't want to wait until the results are published in Break-In, HQ InfoLine, Q-Bit and Spectrum.
- (h) Check logs are welcome.

#### CLAUSE 12. Scoring

You must score your own log, as detailed below.

For ease of scoring, the use of a map with a scale of one to one million, such as InfoMap 265, or similar, is suggested. At this scale 1 mm = 1 km.

#### Table 1 – Basic scores

- 48 cm 0.3 points per kilometre
- 32 cm 0.3 points per kilometre
- 23 cm 0.2 points per kilometre
- 13 cm 0.5 points per kilometre
- Above 3 GHz, one point per kilometre
- Round the points per contact to the nearest integer:
- Less than 0.5 rounds down; 0.5 and above rounds up.

#### CLAUSE 13. Bonus Multipliers (in order of application)

There are no multipliers for "manual" modes such as: CW, AM, SSB, FM and digital voice, etc.

Multiply the basic score by 1.5 for "machine" modes such as: RTTY, ASCII, AMTOR, Packet, SSTV, ATV, etc.

QRP. Multiply previous score by 1.5. Stations may use QRP on some modes, and/or bands, and high powers on others, with multipliers calculated on a contact by contact basis. The establishing of a contact on high power, then reducing the power for scoring purposes, is not permitted.

Field Station, as defined in Section 2 of these Rules—multiply previous score by 1.2.

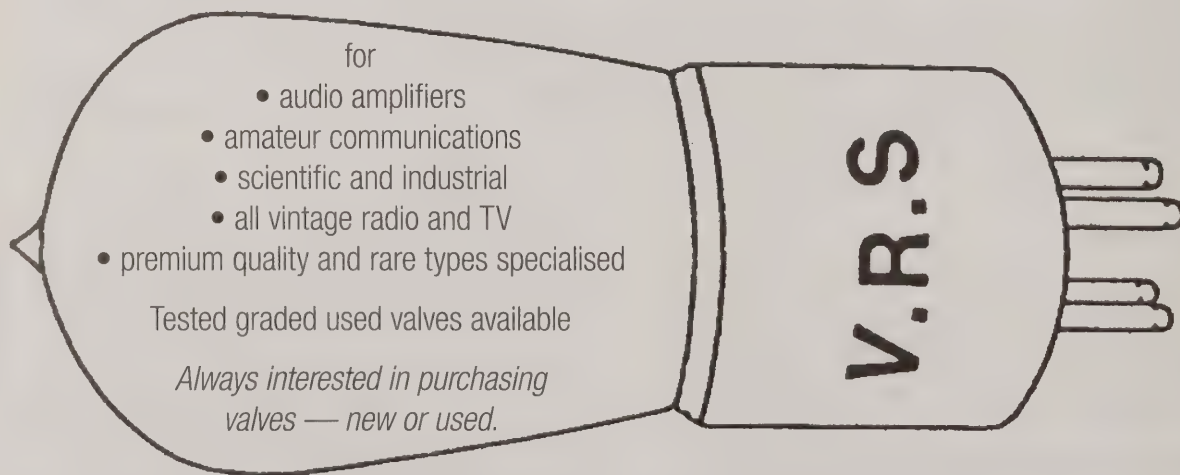
#### CLAUSE 14. Discussion

The ruling of the Contest Committee is final, and no discussion will be entered into.

*June 2006 Edition Updated to February 2010; Change notes the Low Band contest may be deferred by 1 week if it clashes with Easter, as well as with the VHF Convention. This is as promulgated in the NZART Infoline on Sunday, 7 February 2010.*

# VALVE RADIO SPARES

Importers and stockists of quality valves of all types and related items



Geoff Edwards 12 Oxford St Lyttelton 8082  
ph 0274 338452 or 03 3289208 fax 03 3289207 email tubehead@xtra.co.nz

# INTERNATIONAL HF CONTEST CALENDAR

Weekend	UTC	Mode	Contest	Sponsor
<b>January</b>				
First	1800 Sat–2400 Sun	RTTY	ARRL RTTY Round-up	ARRL (USA)
Third	1200 Sat–1200 Sun	CW/SSB	HA DX	MRASZ (Hungary)
Fourth/last	1200 Sat–1200 Sun	RTTY	BARTG Sprint	BARTG (UK)
	0000 Sat–2400 Sun	CW	CQ WW 160m	CQ Magazine (USA)
	0600 Sat–1800 Sun	CW	REF CW	REF (France)
	1300 Sat–1300 Sun	SSB	UBA SSB	UBA (Belgium)
<b>February</b>				
First	0000 Sat–2400 Sun	RTTY	CQ WPX RTTY	CQ Magazine (USA)
	1200 Sat–1200 Sun	CW/SSB	PACC	VERNON (Netherlands)
Third	0000 Sat–2400 Sun	CW	ARRL International DX CW	ARRL
Fourth	0000 Sat–2400 Sun	SSB	CQ WW 160m	CQ Magazine (USA)
	0600 Sat–1800 Sun	SSB	REF SSB	REF (France)
	1300 Sat–1300 Sun	CW	UBA CW	UBA (Belgium)
<b>March</b>				
First	0000 Sat–2400 Sun	SSB	ARRL International DX SSB	ARRL
Second	1000 Sat–1000 Sun	CW	BERU	RSGB (UK)
Third	1200 Sat–1200 Sun	CW/SSB	RDXC	
	0200 Sat–0200 Mon	RTTY	BARTG Spring	
Fourth/last	0000 Sat–2400 Sun	SSB	CQ WPX SSB	CQ Magazine (USA)
<b>April</b>				
First	1600 Sat–1600 Sun	RTTY	EA RTTY	URE (Spain)
	1500 Sat–1500 Sun	CW/SSB	SP DX	PZK (Poland)
Second	0700 Sat–1300 Sun	CW	JIDX CW	
Fourth	1200 Sat–1200 Sun	RTTY	SP RTTY	PZK (Poland)
<b>May</b>				
First	2000 Sat–2000 Sun	CW/RTTY	ARI International	ARI (Italy)
Second	1200 Sat–1200 Sun	RTTY	VOLTA	
Fourth/last	0000 Sat–2400 Sun	CW	CQ WPX CW	CQ Magazine (USA)
<b>June</b>				
Second	0000 Sat–2400 Sun	CW	All Asian DX CW	JARL (Japan)
<b>July</b>				
First	1100 Sat–1100 Sun	RTTY	DL DX RTTY	
Second	1200 Sat–1200 Sun	CW/SSB	IARU WW	ARRL (USA)
Fourth	1200 Sat–1200 Sun	CW/SSB	IOTA	RSGB(UK)
<b>August</b>				
Second	0000 Sat–2400 Sun	CW	WAE CW	



Third	0000-0800 Sat 1600-2400 Sat 0800-1600 Sun	RTTY	SARTG	SARTG (Scandinavia)
Fourth	1200 Sat-1200 Sun	RTTY	SCC	
<b>September</b>				
First	0000 Sat-2400 Sun	SSB	All Asian DX SSB	JARL (Japan)
Third	1200 Sat-1200 Sun	CW	SAC CW	
Fourth/last	0000 Sat-2400 Sun	RTTY	CQ WW RTTY	CQ Magazine (USA)
	1200 Sat-1200 Sun	SSB	SAC SSB	
<b>October</b>				
First	0800 Sat-0800 Sun	SSB	Oceania SSB	NZART/WIA
Second	0800 Sat-0800 Sun	CW	Oceania CW	NZART/WIA
	0700 Sat-1300 Sun	SSB	JIDX SSB	
Third	1500 Sat-1500 Sun	CW	Worked all Germany (WAG)	DARC (Germany)
	0000 Sat-2400 Sun	RTTY	JARTS	
Fourth/last	0000 Sat-2400 Sun	SSB	CQ WW SSB	CQ Magazine (USA)
<b>November</b>				
First	1200 Sat-1200 Sun	CW/SSB	Ukrainian	
Second	0000 Sat-2400 Sun	RTTY	WAE RTTY	DARC (Germany)
	0000-2400 Sun	CW	OK/OM	
Third	1200 Sat-1200 Sun	CW/SSB	LZ	
Fourth/last	0000 Sat-2400 Sun	CW	CQ WW CW	CQ Magazine (USA)
<b>December</b>				
Second	0000 Sat-2400 Sun	CW/SSB	ARRL 10m	ARRL (USA)
Third	0000-2400 Sat	RTTY	OK RTTY	
	1400 Sat - 1400 Sun	CW	9A Croatian	
Fourth	0200 - 1000 Sun	CW	RAEM	



## Award Notes

When applying for an award, whether through NZART or through an overseas Society, courtesy demands that you observe the following: (1) PRINT your name, address and call-sign; (2) Clearly state what award (and endorsements) you are applying for; (3) Supply checking sheet with call-signs, dates of QSOs, mode, etc.; (4) Enclose required funds (currency/IRC/stamps) as requested.

## For NZART Awards

1. The usually accepted rules apply to all NZART awards.
2. NZART stresses the HONOUR SYSTEM. Awards applicants need NOT hold QSL cards for claimed contacts. It is sufficient to merely certify that the QSO was legitimately made. This no QSL rule applies ONLY to NZART sponsored awards.
3. Endorsements for mode/time/location etc., made at applicant's request.
4. New Zealand, US or Australian currency accepted instead of IRC but cheques NOT desirable. New Zealand stamps OK \$1, \$2 preferred. NO KIWI STAMPS.
5. Post applications to NZART Awards Manager, PO BOX 1733, Christchurch Mail Centre, Christchurch 8140, New Zealand.

## Application forms

Suitable for most awards are available from NZART Awards Manager (SASE Please) or on the web at [www.nzart.org.nz/awards/index.html](http://www.nzart.org.nz/awards/index.html)

## Cost of awards.

**NB**—Cost given for awards are those for ZL applicants. Overseas applicants pay US\$5.00 for each NZART award or one IRC per \$1.00.

## For Branch Awards

- Logs need not be verified unless stated.
- All awards are open to shortwave listeners unless stated.
- The honour system also applies to Branch awards.

## CJC

### Captain James Cook Award

To perpetuate the memory of this world famous navigator and seaman—in three classes: Basic "Sailor Class" requires contacts

with—G in Yorkshire; FO; ZL2; VK2; KH6 ... For "Officers Class"—"Sailor Class" contacts as well as ZL1, ZL3, ZL4, VK3, VK4, New Guinea, and any Antarctic station ... For "Command Class", as for "Officer Class" as well as any five of the following—VE2, VO, A35, YJ8, FK8, CE8, KL7.

Certified list (confirmations not required) with \$3.00, overseas US\$5.00, to NZART Awards Manager.

## ENZART

### A prestige award to honour NZART

1. In three parts — (A) Basic award requires 200 points with endorsements for 250, 300, 350 points. (B) Honour award requires 400 points with endorsements for each additional 50 points. (C) HONOUR PLAQUE for 500 points.
2. Points earned as follows by contacting an NZART member who is on the voting roll of the Branch concerned—Phone QSO, 1; CW QSO, 2; Club Station QSO, 2; YL op. QSO, 1; UHF, VHF QSO, 1; Mobile QSO, 1; AMSAT QSO, 1; Branch President QSO, 1.
3. It is essential to clearly determine that the operator contacted is a financial member of NZART and on the voting roll of the Branch concerned.
4. Contacts claimed with a Branch Station must be from a Clubroom or other permanent headquarters, or alternatively when the station is being operated in a contest, from an exhibition, or other activity of a similar kind. Contacts as a result of call-sign "swapping" at a member's QTH are not eligible.
5. Contacts with mobiles are eligible only when the mobile station is within 50 km of his Branch's Clubrooms or his own QTH. (Note rule 3 above.)
6. One station may be claimed in several categories — e.g. the Branch President can be claimed for both Phone and for CW as well as for Branch President — but EACH claimed must be for a separate contact, and the contacts must be not less than 24 hours apart.
7. Contacts must be "Phone to Phone" or "CW to CW".
8. "Club Net" contacts are not

eligible until the net concludes, while contacts made in an organized "awards net" with MC etc., are not eligible.

9. Permanent changes of QTH by claimant are permitted and likewise contacts made during genuine temporary operation.
10. ZL applicants must be members of NZART and all applicants must certify that each contact made fulfils award requirements. No QSL card need be held or submitted but applications must be made on special Check List—cost 10 cents plus SASE (large). Contacts must date 1 November 1976 or later.
11. Each certificate costs \$3.00, overseas US\$5.00. Endorsements free but SASE required. Overseas US\$1.00 Honour Plaque NZ\$10.00, overseas US\$12.00.
12. Applications to NZART Awards Manager.

## IARU Region 3 Operating Awards

To publicise Region 3

1. The award is available to licensed amateurs and SWLs.
2. Contacts made after April 5 1982 are eligible.
3. QSL cards NOT required. Send certified list of eligible contacts from Log Book. Include country in log.
4. Cost is \$3.00, overseas US\$4.00.
5. Eligible countries are those in Region 3 whose amateur societies are members of IARU Region 3 Association. These are: Australia, Bangladesh, Brunei, China (PRC), Chinese Taipei (Taiwan), Fiji, French Polynesia, Hong Kong, India, Indonesia, Japan, Korea, Macau, Malaysia, New Caledonia, New Zealand, Pakistan, Papua New Guinea, Philippines, Pitcairn Island (VR6), Samoa, Singapore, Solomon Islands, Sri Lanka, Taiwan, Thailand, Tonga, Vanuatu, Vietnam. (One contact per country.)
6. PLUS: ONE or more Country credit from US Territories in the Pacific from Guam, Northern Marianas, American Samoa, Wake Island, Baker Howland Group, as presented by ARRL. Chagos Archipelago (VQ9), represented by RSGB. Current total of available "countries" is 34.

Requirements for Award as from January 1 1986: Basic, seven areas; Silver Endorsement, 15 areas; Gold Endorsement, 20 areas. These to be reviewed as considered necessary by the custodian who would recommend appropriately to the Secretariat.

7. Awards may be endorsed for any mode or band.
8. Applications to NZART Awards Manager.

## NZART Guiding Light Award

This award requires contacts with stations within 30 km of the more remote lighthouses and 10 km of the lighthouses near cities. Depending on the degree of difficulty each lighthouse has been allocated one to five points. A total of 20 points are required for the basic "Mariners" Award and 50 points for the "Master Mariners" Award.

### The lighthouses

North Island	Points	km
Cape Reinga	2	30
Cape Brett	1	30
Mokohinau	5	30
Cuvier Island	3	30
Tiritiri Matangi	1	10
Bean Rock	1	10
East Cape	2	30
Portland Island	2	30
Castlepoint	2	30
Cape Palliser	2	30
Baring Head	1	10
Pencarrow	1	10
Somes Island	1	10
Cape Egmont	1	30
South Island		
Cape Foulwind	1	30
Kahurangi Point	3	30
Farewell Spit	2	30
Boulder Bank	1	10
Stephens Island	5	30
The Brothers	2	30
Cape Campbell	1	30
Godley Head	1	10
Akaroa	1	30
Moeraki	1	30
Taiaroa Heads	1	10
Cape Saunders	1	10
Nugget Point	2	30
Waipapa Point	2	30
Dog Island	1	30
Centre Island	1	30
Puysegur Point	5	30

Full log sheets available from Awards Manager. Eligible contacts for this award must be dated November 1 1998 or later. Cost of both awards \$5.00, overseas US\$5.00 or five IRC. Applications to NZART Awards Manager.



## DOCLands Award

### Purpose of Award

To promote the use of Amateur Radio within DOC Controlled Areas. To advertise Amateur Radio from these locations to the public. (see table below)

### Date of Award

For contacts on or after 1 January 2003

### Rules

A station can only be used for one point at each location per trip. If a station is operating from Lake Rotorua in the Nelson Lakes National Park, from the Sabine Hut, that station must state whether it is a National Park, Forestry Hut or Lake Station. The Transmitting station must be located within the boundaries of:

1. Forest Park for Forest Park Credit.
2. National Park for National Park Credit.
3. within 1 km of a lake, within DOC boundaries for Lake credit.
4. Within 10 km of a lighthouse within DOC Boundaries for lighthouse credit, while the station itself must be within the boundaries of DOCLands.
5. Within viewing distance of a DOC Hut within DOC Boundaries for Forest Hut Credit.
6. On an Island controlled by DOC for Island credit. A station can claim itself for working stations from a location.

QSLs not required

Lakes: Lakes as per our Lakeside award, but those on DOCLands only

The log sheet includes the rules and a list of lighthouses on DOCLands is available from the NZART Awards Manager and will be available in PDF format on the awards section of the NZART web site.

## MAIA

### Minor Islands Award

For contacts with minor islands of the New Zealand coast—e.g. Kapiti Island, Portland Island, Great Barrier Island, Little Barrier Island, Waiheke Island, D'Urville Island, Rangitoto Island, Kawau Island, Motutapu Island, etc., from which FIVE contacts are required. Certified list with \$3.00, overseas US\$5.00, to NZART Awards Manager.

1. So-called "islands" which are connected to the mainland by a causeway and rocks are not eligible.
2. The station must be located on the island or within the waters up to one nautical mile offshore, unless prevented by

hazardous conditions.

3. Where public access is available, M/M stations must be on a mooring, ie, wharf, jetty, buoy, or anchor, or on arrival or departure from a mooring.

### National Parks Award

1. For contacts made with stations operating WITHIN boundaries of a New Zealand National Park.
2. Basic award requires TWO contacts.
3. Usual NZART awards rules apply.
4. Endorsement: for each extra two contacts; for VHF Simplex; for VHF via repeater; for each amateur band; etc.
5. Duplicate Contacts (with SAME station) permitted ...
  - \* on different amateur bands
  - \* on different days
  - \* from different Parks.
6. Eligible contacts to date from 1 January 1988.
7. Applications with \$3.00, overseas US\$5.00, to NZART Awards Manager.

### NZ Armed Services Award

This award is presented by the Awards Net to remember all amateur radio operators who have served their country.

This award is open to all amateurs and SWLs.

All contacts made after August 1, 1992 will be eligible for this award.

All Amateur bands and modes may be used.

Repeater contacts accepted.

A station may only be contacted once.

Only one service number may be used.

ZL stations to work 100 contacts.

VK stations to work 50 contacts.

DX stations to work 30 contacts.

Information required: Log data, Service Number, Service in which served (ie, (A) Army, (AF) Air Force, (N) Navy.

Cost of Award: \$3.00, overseas US\$5.00.

Custodian: NZART Awards Manager.

Check sheet and rules also available from Awards Manager with SASE.

Provision for Award Update if required.

### NZA — New Zealand Award

Available to all radio amateurs other than ZL.

#### Requirements:

- 35 contacts with ZL1.  
plus 35 contacts with ZL2.  
plus 20 contacts with ZL3.

## NZART GUIDING LIGHT AWARD

### MARINER CERTIFICATE



Cape Brett  
Award No: 1  
ZL Award No: 1

Awarded to  
Smythe, A. 1992  
For contacting Lighthouses around New Zealand

The Coast Lighthouse Lighthouse  
Date: 1 January 2000  
Custodian: Alan Chapman ZL30X

plus 10 contacts with ZL4  
plus one contact with ZL  
"territory" — either from New Zealand, Antarctica, Chatham Islands, Kermadec Islands, or Campbell Island. This one contact may be substituted by 20 ordinary ZL contacts if desired.

This makes a minimum of 101 contacts which should be dated from December 8, 1945. Cost overseas US\$5.00.

### NZC — New Zealand Counties

Basic award required contacts with 20 different New Zealand Counties. Endorsements for 40, 60, 80, 100 are made with a special certificate for 112. Map showing counties is depicted elsewhere in this section, while checking sheet is available from NZART Awards Manager.

1. Initial certificate with any or all endorsements to 100 costs \$3.00, overseas US\$5.00.
2. Separate endorsements to 100, after issue of basic award. Endorsement sticker send SASE overseas \$US1.00.
3. Special Certificate for "NZC 112" costs \$3.00, overseas US\$5.00.
4. Checking sheets which MUST be used and which are returned to applicant for record purposes cost SASE, overseas US\$2.00.
5. NZC "224" — the "224" Shield was instituted to recognize very outstanding achievement — that of "double 112" with different stations contacted in the relevant counties for each NZC 112. Current cost is \$15.00, overseas US\$25.00. Paper version available \$5.00 overseas \$US5.00. Applicants for NZC 224 must first hold TWO NZC 112 Awards. Send BOTH log sheets when applying for 224.
6. The operator on a "County DXpedition" whether Mobile or Fixed Portable may claim

that County for his own NZC credit.

7. The original "Counties List" will be maintained irrespective of deletions or additions. The criteria will be the actual area of operation which must be determined by the honour of the operator.

### NZLA — New Zealand Lakeside Award

1. For Basic Award, contacts are required with stations operating on the shores of TEN (10) freshwater lakes in New Zealand. Endorsements for each additional ten lakes up to 40; Honour Award for 50 lakes with further endorsement for each additional ten.
2. Stations must be located within ONE kilometre of the water or in a town on the lake shore.
3. Full rules are with the Check Sheets which MUST be used when applying for NZLA.
4. Basic Award costs \$3.00, overseas US\$5.00. Any endorsements SASE, overseas US\$1.00.
5. Check Sheets from NZART Awards Manager to whom all applications must be directed.
6. Eligible contacts must date May 1, 1976 or later. NOTE: Check Sheets are returned to applicant and make up a complete record of lakes credited towards award. Basic work for this award was done for NZART by Mike Groth ZL1AHF.

### NZART Century Award Basic requirements

This award is based on the Maidenhead Locator System. The award is open to all amateurs and SWLs. One hundred different sub-squares are required for the Basic Century Award. (100 sub-squares)

Certificates are available for 500, 1000, 1500, 2000, 3000 & 4000 sub-squares.  
 Each contact must state the full six digits of the Locator position, eg, RF66HK.  
 Eligible contacts must date January 1, 2000 or later.  
 Any operator on a "Century Award DXpedition" whether mobile or portable may claim the sub-square for their own credit.  
**Note**  
 All contacts must be from the New Zealand mainland or surrounding islands.  
 Log sheets and maps, which give a broad outline of the Squares are available. The map supplied does not give an accurate position of the squares. Info maps that have latitude and longitude must be used for the position of the Sub-squares. For example, InfoMap series 242-1, 242-2, 242-3, 242-4, or similar.  
 Google maps <http://f6fvy.free.fr/qthLocator/fullScreen.php> will show your locator.  
**Cost** Certificates NZ, A, US\$5.00 each.

**Railways Award**  
 To work amateurs within one kilometre of Railway Stations which are the stopping places for the original "Northerner", "Southerner" and Picton-Christchurch Express. (Auckland to Invercargill). Full rules on the Check sheet.  
 Application with \$3.00 or Check sheet, which contains full rules, is available, send SASE to; NZART Awards Manager.

**NZR Regions Award**  
 This award is similar to the NZ Counties Award but relates to the current Regional Districts.

**Basic requirements**  
 Initial certificates with four Regions and 18 Districts.  
 Stickers for 8/36 and 12/54 Regions and Districts.  
 Special award for all Regions and Districts.  
 Contacts must date 1 January 2000 or later.  
**Cost** Basic award NZ\$5.00.  
 Endorsement sticker, send a SASE.  
 Overseas US or A\$5.00 or five IRCs. Endorsements \$2.00 or one IRC.  
 All Regions and Districts Award  
 NZ\$5.00, US\$5.00 or A\$5.00.  
 Double Region Award \$15.00, overseas \$25.00.  
 Paper version available \$5.00, overseas \$US5.00.  
**Boundaries**  
 The boundaries are as per

InfoMaps 242B-1 to 242B-4 (four maps) and will remain to give a basis of stability.  
 Applications for the award must be on the log sheets which are available from the NZART Awards Manager. Send SASE or via e-mail (PDF file).  
 The following is a list of Districts (bold italic type) and the regions.

**North Island Regions**

**Northland**

- Far North
- Whangarei
- Kaipara

**Auckland**

- Rodney
- North Shore
- Waitakere
- Auckland
- Manukau
- Papakura
- Franklin\*

**Waikato**

- Thames-Coromandel
- Hauraki
- Waikato
- Matamata Piako
- Hamilton
- Waipa
- Otorohanga
- South Waikato
- Waitomo\*
- Taupo\*

**Bay of Plenty**

- Western Bay of Plenty
- Tauranga
- Rotorua\*
- Kawerau
- Whakatane
- Opotiki

**Gisborne**

- Gisborne

**Hawkes Bay**

- Wairoa
- Hastings
- Napier
- Central Hawkes Bay

**Taranaki**

- New Plymouth
- Stratford
- South Taranaki

**Wanganui-Manawatu**

- Ruapehu
- Wanganui
- Rangitikei\*
- Manawatu
- Palmerston North
- Horowhenua
- Taranua

**Wellington**

- Masterton
- Carterton
- South Wairarapa
- Kapiti Coast
- Porirua
- Upper Hutt
- Lower Hutt
- Wellington

**South Island Regions**

**Nelson**

- Nelson

**Marlborough**

- Marlborough

**Tasman**

- Tasman

**West Coast**

- Buller
- Grey
- Westland

**Canterbury**

- Kaikoura
- Hurunui
- Selwyn
- Waimakariri
- Christchurch
- Banks Peninsula
- Ashburton
- Mackenzie
- Timaru
- Waimate

**Otago**

- Waitaki\*
- Queenstown-Lakes
- Central Otago
- Dunedin
- Clutha

**Southland**

- Gore
- Southland
- Invercargill

\* Districts cross Regions boundaries.

**Tiki Award**

Work five different ZLs each on FIVE different bands dated post-war. Cost \$3.00, overseas US\$5.00.

**ZL1 Award**

Basic Award requires contacts with 125 different ZL1 stations dating post-war. Endorsements 175 and 250.

**ZL2 Award**

Basic Award requires contacts with 100 different ZL2 stations dating post-war. Endorsements for 150 and 200.

**ZL3 Award**

Basic Award requires contacts with 50 different ZL3 stations dating post-war. Endorsements for 75 and 100.

**ZL4 Award**

Basic Award requires contact with 25 different ZL4 stations dating post-war. Endorsements for 35 and 50.  
 Note: cost of ZL1/2/3/4 Certificates is \$3.00, overseas US\$5.00, each with any endorsements. Further endorsements send a SASE, overseas US\$1.00, UNLESS a new certificate is required instead of "sticker", in which case the cost is as above. On issue, certificates will be endorsed for band/mode as requested and for any yearly period of time (January through December). Such endorsements

are of course available to applicants at any time after the initial award has been made. ZL or ZM combination is OK. Applications with list to NZART Awards Manager.

**VHFCC — VHF Century Club**

One hundred points required from QSOs with ZL stations on the following basis:

- 50 MHz band contacts count 1 point.
- 144 MHz band simplex contacts count 3 points. Repeater contacts 1 point.
- 432 MHz band simplex contacts count 6 points. Repeater contacts 1 point.

(Further bands may be added in the future).

The same station may be claimed once on any one band but may be claimed repeatedly on different bands.

Endorsement stickers available for 200, 300, 400, 500 points. Cost \$3.00, overseas US\$5.00.

**WAD — A VHF Award**

Contacts required on any VHF band (or mixture of VHF bands) with ZL1, ZL2, ZL3, ZL4—One contact per Call Area. (Not out of Call Area callsigns.) Cost—\$3.00. Send stamps rather than coins or cheques. Overseas \$5.00 A or US.

Endorsements for Satellite QSOs. Calcification of Call Area. For example, you can't claim ZL1 area if the ZL1 is in the ZL3 call area. You may claim the ZL1 for the ZL3 area if they are in the ZL3 area. Repeater contacts OK.

**WAP — "Worked All Pacific"**

Contacts required with 30 different "Oceania Countries". Eligible countries ... Any Oceania country, ie eligible as Oceania for WAC (see DXCC list). Cost \$3.00, overseas \$US5.00. Please include country on log sheet.

**Five Band WAP**

Contact any 30 eligible Pacific Countries (as counting for Oceania for WAC), each on FIVE different bands making a total of 150. (6, 7, 8 or 9 bands also available.)  
 Send list of log extracts (QSLs not required to be held) to Awards Manager ... with \$15.00, overseas US\$25.00.  
 AWARD: Wooden Shield surmounted with NZART badge and suitably inscribed.  
 Paper version available \$5.00, overseas \$US5.00.



## WAZL — "Worked All New Zealand"

Contacts required for 45 different Branches of NZART— EXCEPT FOR OVERSEAS APPLICANTS (for whom only 35 are required). Special endorsement when WAZL completed within 12 month period. NB: Mobiles operating outside their own Branch Area must use the Branch Number of the area in which they are operating (for WAZL credit). Cost \$3.00, overseas US\$5.00 to NZART Awards Manager.

### NZART Branches for WAZL

- 01 Ashburton
- 02 Auckland
- 03 Western Suburbs
- 04 Cambridge
- 05 Christchurch
- 06 Tararua
- 07 Not issued
- 08 Eastern Southland
- 09 Egmont (in recess)
- 10 Franklin
- 11 Gisborne
- 12 Hamilton
- 13 Hastings/Havelock North
- 14 Hawera (in recess)
- 15 Central Hawkes Bay (in recess)
- 16 Horowhenua
- 17 Huntly
- 18 Hutt Valley
- 19 Inglewood
- 20 Manawatu
- 21 Manukau
- 22 Marlborough
- 23 Marton and Districts
- 24 Motueka

- 25 Napier
- 26 Nelson
- 27 New Plymouth
- 28 Whangarei
- 29 North Shore
- 30 Otago
- 31 Pahiatua (in recess)
- 32 Rāhōtu Coastal (absorbed in Br 87)
- 33 Rotorua
- 34 South Canterbury
- 35 South Otago
- 36 South Westland (in recess)
- 37 Southland
- 38 Taumarunui (in recess)
- 39 Tauranga
- 40 Te Awamutu
- 41 Thames
- 42 Titahi Bay
- 43 Waihi and Districts
- 44 Matamata (in recess)
- 45 Waimarino (in recess)
- 46 Wairarapa
- 47 Waitara
- 48 Wanganui
- 49 Westland
- 50 Wellington
- 51 Eastern Bay of Plenty
- 52 Northern Hawkes Bay (in recess)
- 53 Te Puke
- 54 Patea (absorbed in Br 87)
- 55 Waitomo
- 56 Christchurch West
- 57 Tokoroa (in recess)
- 58 Helensville (in recess)
- 59 Mangakino (in recess)
- 60 Taupo
- 61 Central Otago
- 62 Reefton-Buller
- 63 Upper Hutt
- 64 North Otago
- 65 Papakura

- 66 Auckland VHF
- 67 Kawerau
- 68 North Canterbury
- 69 Kapiti
- 70 Feilding (in recess)
- 71 Rodney
- 72 Opatiki
- 73 Northern Wairoa (in recess)
- 74 Wellington VHF
- 75 Queenstown (in recess)
- 76 Kaikoura (in recess)
- 77 Te Aroha (in recess)
- 78 Far North Districts
- 79 Howick and Districts (in recess)
- 80 Hibiscus Coast
- 81 Waikato
- 82 Southern Wairarapa (in recess)
- 83 Raglan
- 84 Bay of Islands
- 85 Mercury Bay
- 86 Suburban
- 87 South Taranaki
- 88 Tauranga Emergency Communications Group

who must include in addition to the above, both operators names and call-signs.

6. Logs must include at least 20 ZL contacts.

7. Send \$3.00, overseas US\$5.00, to the NZART Awards Manager.

### "5 x 5"—Five by Five

This premier award has been instituted to recognize the increasing interest in Five Band DX operation. The initial award requires that the same station be contacted on five bands repeated with five different DXCC countries. First endorsement after a further five has been contacted (total of 10) with the 20 endorsement requiring another ten and so on to 100. Certified list with full QSO data and fee of \$3.00, overseas US\$5.00, which includes all endorsements. Certificate is outstanding and is overprinted in embossed gold. Contacts must date from 1945.

### ZLA Award

Contacts required with Auckland City, Wellington City, Christchurch City, Dunedin City, Antarctica ZL5, Campbell Island, Chatham Island, Kermadec Island. Applicants must send certified list to NZART Awards Manager with \$3.00, overseas US\$5.00.

### Yearly Award

This award is an annual award starting on 1 January and ending on 31 December each year.

The rules are as follows:

1. A total of 80 contacts required.
2. The numbers of years licensed must be obtained from station worked.
3. The licensed years are totalled to 1000 or more years.
4. Log details must include the operator's call-sign, name, licensed years and date worked.
5. The award is open to all SWLs

## NZART BRANCH AWARDS

### Aotearoa Postcode Award

This award has been presented to stimulate awareness and the use of postcodes in the New Zealand postal system — at least by the amateur fraternity.

To some extent it is a sister award to the Australian Amateur Radio Postcode Club.

1. The award is open to all Amateurs and SWLs.
2. All contacts made on or after 20 October, 1991, will be eligible for the award.
3. A certificate will be issued for basic qualification, and stickers for the various following upgrades.
4. Portable and mobile stations must give the postcode for the particular area they are in and can claim that postcode for the award.
5. Basic Award: Make contact

with ZL stations and obtain their QTH and Postcode. Then use the suffix letters of the station claimed to complete the following phrase — AOTEAROA LAND OF THE LONG WHITE CLOUD.

Each letter of a call-sign may only be used once unless that station is contacted in a different postcode area. Claim each postcode once only.

6. Upgrades: Stickers will be issued as follows: Postie — 100 different postcodes; Mail Officer — 150 different postcodes; Supervisor — 200 different postcodes; Branch Manager — 250 different postcodes. (There is provision for an extension for the enthusiast.)
7. All amateur modes and bands may be used. Repeater

contacts accepted.

8. Cost: Basic certificate —  
ZL stations \$3.00  
VK stations US\$2.00  
DX stations US\$3.00  
Upgrades — ZL stations SASE plus \$1.00 for first — SASE for other three. VK Stations SASE plus \$1.00 stamp for each upgrade. DX stations SAE plus US\$1.00 for each upgrade.
9. On application send a log with the following: date of contact, station contacted, postcode number, and area to Awards Manager, 48 Leslie Street, Waitara 4320.

As NZ Post revamped the system in July 2006, all old numbers will be accepted for contacts made up to 31 August 2006. From 1 July 2006, the new numbers are acceptable.

### Bay of Plenty Award — Series 2

Sponsored by the Tauranga Branch 39 of NZART for working stations in the Bay of Plenty region — ie, Opatiki, Rotorua, Tauranga and Whakatane Counties and all cities and districts within this region.

ZLs need either 10 stations on any band or five stations on 50 MHz or higher.

The rest of the world need five stations on any band.

All stations to be in different Maidenhead Locator sub-squares, since January 2006.

This award is available to Listeners on a "heard" basis. Applications with \$4.00 (overseas US\$5.00) with checklist showing station, date and time, worked mode and band (QSLs not required) to Secretary Tauranga NZART, C/- Emergency

Management Office, WBOP District Council, Private Bag 12 803, Tauranga Mail Centre, Tauranga 3143.

**Christchurch Award Requirements**

Christchurch amateurs (those within the normal coverage of the 705 repeater) 25 different stations; rest of ZL — 15 stations; VK — 10 stations; rest of world — five stations. Definition of a Christchurch station that may be worked for this award is any station that is operating from within the metropolitan area of Christchurch. Cost: ZL and VK NZ\$5.00; others US\$4.00 or equivalent. Applications to Christchurch Amateur Radio Club Awards Manager, PO Box 1733, Christchurch Mail Centre, Christchurch 8140.

**Christchurch Amateur Radio Club Branch 05 Brasspounders' Club Award**

The aim of this award is to promote Morse technique in a friendly competitive way and to encourage conversational CW between fellow amateur radio enthusiasts.

A Certificate of Accomplishment will be issued by the Christchurch Branch Awards Manager when suitable evidence shows that the applicant has gained the appropriate points total.

For the "INITIAL AWARD" (25 points minimum) the following QSO types are acceptable.

1. CW QSO with Christchurch Amateur Radio Club Branch 05 Club member — one point.
2. CW QSO with Christchurch Amateur Radio Club Branch 05 "Brasspounders" Club member — two points
3. CW QSO with Christchurch Amateur Radio Club Branch 05 "Brasspounders" Club member via ZL3AC Club Station—four points  
Bonus points may be added to each of the above according to the following criteria:
4. If the QSO was conducted throughout using a STRAIGHT key, claim two bonus points.
5. If the QSO was conducted throughout using an a ELECTRONIC keyer or SEMIAUTOMATIC key (bug type) claim one bonus point.

A QSO conducted with COMPUTER Morse will not be eligible for a bonus.  
Type "3" QSOs if multiple, must be spaced at least 24 hours.

**Award Par Excellente 60 points minimum**

For "AWARD PAR EXCELLENTE", New Zealand "Home Stations" must include at least two type "1" QSOs, and there is no points limit on type "5" contacts. Where the same station is being claimed more than once, there must be at least 24 hours separation between the QSOs.

Overseas stations need only one type "1" QSO for their "Award Par Excellente" included with their claim, and may claim two points for each "ZL" QSO together with one extra bonus point if the "ZL" is a "Branch 05 member". At least 24 hours must separate QSOs where the same station is being claimed more than once.

**Rules**

**Frequencies:** All Amateur Band CW frequencies may be used.

**Who:** All Radio Amateurs.

**Claims:** Log extracts showing date, time on/time off, signal reports, other operator's call and QTH.

**Check:** Log extracts shall be countersigned by one other similarly licenced amateur operator.

**Duration:** Contacts claimed shall have been of at least one quarter hour (15 minute) duration.

**Signals:** No claims will be accepted with reports of T7 or lower.

**When:** Only QSOs commenced after the inauguration are acceptable. Inauguration date is 1 February, 1993. There is no closing date for claims unless the award termination is promulgated.

**Points:** Points claimed for "INITIAL AWARD" may not be used for the "AWARD PAR EXCELLENTE".

**Costs:** NZ\$12.00 Initial Award. The Club Station ZL3AC will be on the air from 0800 UTC on an occasional basis. The operating frequencies are from 3.5 MHz to 3.575 MHz and on other HF bands depending on conditions.

Address all claims to Christchurch Amateur Radio Club Awards Manager, PO Box 1733, Christchurch Mail Centre, Christchurch 8140, New Zealand.

**City of Dunedin Award**

Otago Branch 30 promotes this award which features colour photographs of Albatrosses in the colony on the Otago Peninsula, the lighthouse at Tairua Heads, and a view of Dunedin City from Stuart Street.

Contacts since 1 July, 1986 eligible and the required 10 points for ZL applications (five point DX)

may be accumulated from the following allocations:

ZL4AA Branch station	3 pts
Branch 30 President	2 pts
Branch Life Member	2 pts
Branch YL	2 pts
Other Branch members	1 pt

Award is open to SWLs. NO repeater contacts and each station can be worked ONCE only. Any one band/mode or a combination of any bands/modes may be used. Cost — NZ\$2.50 with application to Awards Manager, PO Box 5485, Moray Place, Dunedin 9058.

**Fiordland National Park Award**

**Requirements:** Contact four separate stations/operators in or within one kilometre of the Fiordland National Park, plus two contacts with Branch 08 members. Total — six contacts. Send log (no certifying required) with \$5.00 to Branch 08, C/- PO Box 9, Wyndham 9849.

**Gisborne Award**

**Requirements:** Contacts after 1 January 1969, as follows: Gisborne amateurs — five different stations. ZL — four stations. Rest of world — two stations.

**Cost:** ZL/VK/US\$5.00. Apply to Ric Coleman, 12 Grundy Street, Mangapapa, Gisborne 4010.

**FISTS Down Under Award**

The FISTS Down Under Award is earned by accumulating 50 points. For this award contacts with any FISTS Down Under (FDU) member in ZL or VK since the inauguration of FISTS Down Under on 1 June 1988 are worth one point. Contacts with FDU affiliated club stations are worth five points each. (Currently ZL6FF, VK2FDU, ZL2SWR and VK4RC/VK4IZ.) This award is available for all FISTS Club members worldwide. A station can only be claimed once. — Note, the one point for working a FDU station is the same for all members, (i.e. there is no premium for working outside one's country.)

Please note the special e-mail address for applications for this award, z12aoh@ihug.co.nz or by post to Ralph Sutton ZL2AOH at call book address. Internet: <http://fistsdownunder.org>

**Kapiti Branch Award**

1. Ten points required on any band — including VHF-UHF and repeater contacts. Different stations are required.

2. One point for any NZART member residing permanently in the district.
3. Two points for any branch member.
4. Three points for any committee member.
5. Four points for ZL2KB.
6. Net contacts are permitted, except the Branch net.
7. A listeners' award is available. Recording of sufficient two-way contacts worth 10 points.
8. Packet contacts attract two points each for Kapiti Branch member worked direct.
9. Double points for CW contacts, excluding Field Days.
10. No two contacts with the same station are permitted.
11. Price \$5.00 per certificate.
12. Enquiries to Award Manager, Kapiti Amateur Radio Club, C/- P O Box 81, Paraparaumu 5254.

**Kawerau Woodskills Festival Award**

This is to run the first two weeks in September each year. Contacts with Kawerau Branch 67 stations on any band, ie, HF, VHF, UHF.

**Rules**

Ten points required for ZL applicants (five points for DX stations) may be accumulated as follows:

1. ZL1KW worth five points, Branch President worth three points, Vice President worth three points, any other Branch member one point.
2. Award is available to all Amateur operators or SWLs who accumulate 10 points.
3. The Award application containing a copy of log details or SWLs, name and address plus \$5.00 fee to be received by The Awards Manager no later than November 1 each year.

Applications for this Award to the Awards Manager, Branch 67 NZART, C/- Bev Osborne ZL1QS, 34 Cobham Drive, Kawerau 3127, New Zealand.

**Manawatu Award**

For overseas stations working FIVE stations who are members of Manawatu Branch 20. Certified list and US\$3.00 or five IRCs to ZL2AFT, 429 Albert Street, Palmerston North 4410.

**Manawatu Amateur Radio Society Windmill Award**

The Manawatu Amateur Radio Society Windmill Award is open to all Amateurs and SWLs. To obtain the award stations require seven contacts with Branch 20 members of which one must be



a compulsory contact with the Branch Station ZL2KO. Stations may only be contacted once and must be financial members of Branch 20 at time of contact. All contacts to be made after 1 September 2000.

Overseas stations only need to contact five branch members and the club station is not a compulsory contact for them but optional.

The award is open to all amateurs and SWLers. The cost of the award is NZ\$6.00. Overseas US\$5.00 for overseas stations. Please note that this is a separate award to the branch DX award although it is open to DXers.

Applications should be made to: Award Custodian, Manawatu Amateur Radio Society, PO Box 1718, Palmerston North Central, Palmerston North 4440.

### Papakura Radio Club "21" Award

For contacts with ZL1VK (5 points) and 8 members (2 points each) of the Papakura Radio Club, total of 21 points. These revised rules apply to contacts made after 1 January 2011. Certified list and \$5.00 to Secretary, Papakura Radio Club, PO Box 72-397, Papakura, Manukau 2244.

### Reefton-Buller Award

Basic Award requires contact with any five Branch 62 members. Merit Award requires, in addition to Basic, that ZLs contact one Branch 62 XYL or YL and the Club station ZL3BRC. Overseas stations contact any one of those mentioned above. Two categories HF and VHF.

NO QSLs required. Send certified list with \$5.00 to NZART Awards' Manager. List of members etc available from Branch 62 Secretary.

### Rag Chewers Award

The award is for a non-stop half hour QSO with any station, on any band, or any mode.

This award was first introduced into New Zealand in 1931 by Alex Rennie ZL2AR.

The certificate is the artist's impression of a "Rag Chewer" and sketched by the well-known cartoonist Jim Hubbard and is professionally printed on gloss paper.

A fee of \$5.00 is applicable.

Application for the award can be made to: Ivan Horn ZL2ATU, P.O. Box 7250, Wanganui 4501.

### The Tane Mahuta Award

By Branch 28 with VHF and HF

### Rules

1. The HF Tane Mahuta Award for 20 contacts including at least one in each of the Counties of Rodney, Otamatea, Hobson, Hokianga, Mangonui, Whangaroa, Bay of Islands, and Whangarei with the rules of NZC Award applying.
2. The VHF Tane Mahuta Award for 20 contacts including at least one in each of the Locator Squares RF63, RF 64, RF65, RF74 and that part of RF73 north of 36° 30'; that is, with Sub-Squares ending in M to X. Contacts must be made from one square to another.
3. Portable and Mobile operation is permitted.
4. Multiple contacts are permitted provided the station contacted is located in a different County or Locator Square for each contact.
5. Repeater contacts are permitted if they are made through Northland repeaters at 6650, 6750, 6775, 7100, 7150, from outside the Northland area.
6. Contacts on or after January 1, 1985 are eligible.
7. QSL cards are not required. Send certified list of relevant data. BUT for the VHF Award it is necessary to establish the full QTH Locator of the station worked.
8. Applications to Tane Mahuta Award, PO Box 10-078, Te Mai, Whangarei 0143, with cost as within New Zealand NZ\$5.00, Australia A\$5.00, others US\$5.00.

### Trigtop Award

**Aim 1:** To contact operators from hilltops around the country.

**Aim 2:** To encourage people to venture up hilltops with amateur radio.

### Brief Description

Log contacts you make with hilltop stations to accumulate contact points. Persons with top three points total per calendar year will receive a first, second or third award for that year. Persons scoring over 500,000 will receive an award.

### Rules

- Contact may be made once with a trigtop station per day, per hilltop. If an operator stays at a trigtop overnight you may work him or her the next day. If an operator moves to another trigtop in the same day you may also rework him or her.
- Trigtop stations must be within 50m of a trig station as shown on any NZGD2000 Topo 50 map. These are shown by a



solid or hollow triangle. "Spot heights" are not counted for this award.

- Operators may access a trig by any means. The mode of transport however will affect the score.
- An operator at a trigtop may claim the hilltop points for him or herself if he or she makes one QSO with another amateur operator. They may self claim only once.
- Permission must be sought by the landowner to access trigtops on private land. Any reports of illegal trespassing will nullify all contacts made from the trig concerned. DOC land and public land is exempt from this. If you are within 50m of a trig and on public land you may claim the trig, provided you do not need to cross into private land at any time without permission.
- Stations must follow band plan and amateur rules to be eligible for the award.

### Scoring

**Base points** – The altitude above sea level of the trigtop as shown on the 260 series maps.

**Multiplier 1** – Mode of access to trigtop. X 2 for walking over 100m vertically or over 500m horizontally to the trigtop X1 for all other modes of transport accessing the site.

**Multiplier 2** – Retransmission X 2 for simplex contacts.

X1 for contacts through repeaters, or other retransmission devices. **Multiplier 3** – Activation a Trig X 3 if you are the station at the trigtop X1 if you are the station working the trigtop station

### Exchange

A valid contact must exchange the following

- Callsign
- Signal Report
- Trigtop Name if known, or

NZMG grid reference if not known.

- Trigtop height for scoring as shown on 260 series maps. Do not rely on GPS readings.
- Multipliers for scoring.

### Logs

A sample log is attached. Logs must carry the information exchanged in the QSO, and all scoring information. Logs should be submitted for the annual place getter prize in the month of January for the previous calendar year. Logs submitted to claim the award may be submitted at anytime.

### Special Case

If one trigtop is working another trigtop, to claim both their and your own points, make two QSOs. The first for your own trigtop to claim for yourself. The second to claim the points of the trigtop you are working. This should be shown in the log as two QSOs.

### Appendix 1 – Grid Reference

Map number and 6-figure grid are acceptable for this. Refer to the 260 series of maps for details on how to supply a 6-figure coordinate. State the map number and 6-figure grid in your log. These are accurate to 100m.

### Appendix 2 – Multiplier 1

To claim 100m vertical walking, you must have started your tramp at a height above sea level 100m less than the trig. Thus you must have ascended at least 100m to get to the trig. To claim 500m horizontal, your tramp must have taken you over 500m of ground. This equates to half a square on 260 series maps. Meeting either of the above conditions makes you eligible for multiplier 1.

Enjoy this award

Warren Harris

ZL2AJ

warren@technaserve.com

### Wairarapa Regional Award

This Award is sponsored by

Branches 06, 46 and 82.

#### Requirements for Award:

work eight counties, 12 towns, 15 postcodes, three lakes, four hospitals, eight rivers, two aerodromes, two lighthouses and 23 museums/historic places. The Award can be worked in three stages: basic, upgrade and final. A check sheet for working the Award is available on written request with SASE, from the Awards Manager, PO Box 860, Masterton 5840.

This Award may be worked on all bands and all modes starting from 1 January 1997. The "Basic" award costs \$5.00. "Upgrade" and "Final" stickers are free on receipt of check sheet and SASE.

#### Waitomo Award ZL1IZ

Make 10 points with Branch 55 contacts as follows: VHF Simplex or CW, two points; VHF or UHF Repeater, 1 point; HF Phone, one point; HF CW, two points; VHF

or UHF Satellite, two points; Club Station ZL1IZ, two points. Echolink or IRLP with branch members' one point. Log details and \$5.00 to ZL1IZ, I. M. Howitt, 3/49 Hinewai Street, Otorohanga 3900. More info on [www.qrz.com](http://www.qrz.com). ZL1IZ, AL1HJ, ZL4SQ, ZL1SQ-R Club repeaters 147.375, 147.225

#### Wanganui Award

For contacts since 1 January 1982 with permanent residents in the Wanganui area — one point; with Wanganui-based Mobile stations regardless of location — one point; with ZL2JA — two points. Overseas stations require three points; ZLs require five points. (Repeater contacts acceptable.) QSO details with \$5.00 or five IRCs to Award Manager, 1 Caversham Road, Wanganui 4105.

## WARO AWARDS

#### General

Contacts may be any mode, any band with NZWARO members who are financial at the time of the contact. No QSLs required. Send full log details certifying that the contacts have been made to Award Manager, Lynnette McDonald ZL1LL, 25 John Street, Pukekohe 2120, New Zealand, with sufficient postage for return of award.

#### NZWARO HF Award

ZL and VK stations work 10 WARO members resident in New Zealand, DX stations work five. Endorsement seals available to ZL and VK stations for each additional 10 contacts, DX stations five. Contacts with DX members of WARO qualify for endorsements by endorsement application must contain at least three ZL contacts.

#### NZWARO VHF/ UHF Award

Stations work 10 WARO members on VHF or UHF (repeaters allowed). Endorsements for each additional five.

#### NZWARO Century Award

1. Applications to contain full log details of contacts with 100 NZWARO members (DX members included).
2. Contacts may be any mode, any band, and each member claimed must be a financial member of NZWARO at the time of the contact and may be counted once only.

#### NZWARO Mountain Buttercup Award

1. For contacts with licensed NZWARO members, resident, visiting, mobile, etc, in the 60 towns named in the official list. A WARO member working mobile, portable, etc, may claim the relevant town for her own credit. The same WARO member may be contacted in any number of towns.
2. Basic award is available for list of 15 contacts with endorsement seals for each further 10 contacts up to the full 60 required. Applicants submitting a list of the full 60 valid contacts will receive a special award distinctive from the one gained for the lesser number of contacts.

3. Contacts may be any mode or any band, but each YL worked must be a financial member of NZWARO at the time of the contact and must be within a 25 km radius of the town claimed. An official list of towns required to be worked is listed below or is available from the Manager on receipt of an SAE.

#### North Island

1. Auckland
2. Dannevirke
3. Dargaville
4. Eketahuna
5. Featherston
6. Gisborne
7. Hamilton
8. Hawera
9. Helensville
10. Kaikohe
11. Kaitaia
12. Masterton
13. Matamata
14. Morrinsville
15. Napier
16. New Plymouth
17. Opotiki
18. Orewa
19. Otaki
20. Paihia
21. Palmerston North
22. Papakura
23. Putaruru
24. Rotorua
25. Taihape
26. Taumarunui
27. Taupo
28. Tauranga
29. Thames
30. Te Awamutu

31. Te Kuiti
32. Turangi
33. Upper Hutt
34. Waihi
35. Wairoa
36. Wanganui
37. Wellington
38. Wellsford
39. Whakatane
40. Whangarei

#### South Island

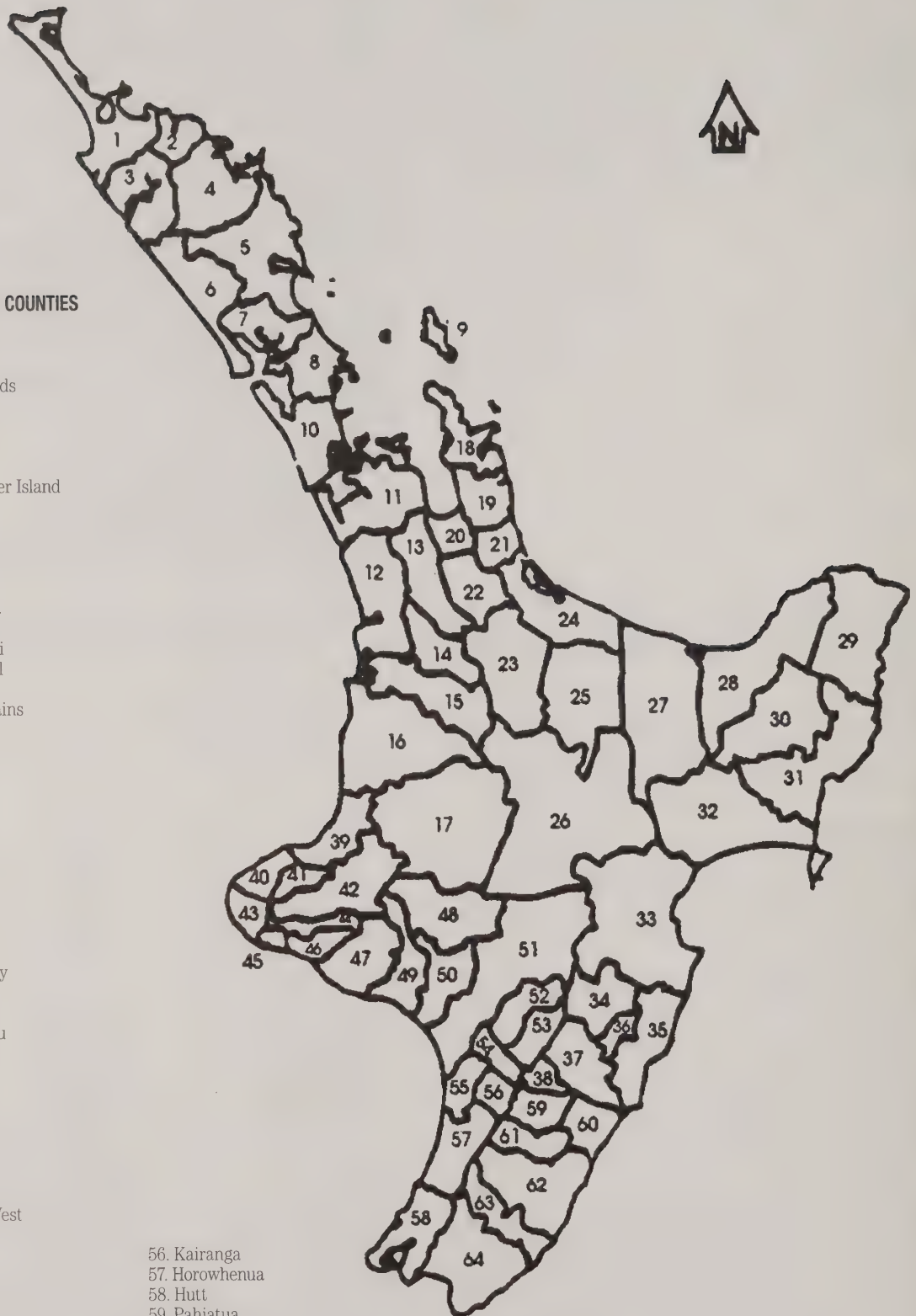
41. Alexandra
42. Ashburton
43. Balclutha
44. Blenheim
45. Christchurch
46. Cromwell
47. Dunedin
48. Gore
49. Greymouth
50. Hokitika
51. Invercargill
52. Kaikoura
53. Motueka
54. Nelson
55. Oamaru
56. Queenstown
57. Reefton
58. Timaru
59. Wanaka
60. Westport



# NORTH ISLAND COUNTIES

## NORTH ISLAND COUNTIES

1. Mangonui
2. Whangaroa
3. Holianga
4. Bay of Islands
5. Whangarei
6. Hobson
7. Otamatea
8. Rodney
9. Great Barrier Island
10. Waitemata
11. Franklin
12. Raglan
13. Waikato
14. Waipa
15. Otorohanga
16. Waitomo
17. Taumarunui
18. Coromandel
19. Thames
20. Hauraki Plains
21. Ohinemuri
22. Piako
23. Matamata
24. Tauranga
25. Rotorua
26. Taupo
27. Whakatane
28. Opotiki
29. Waiapu
30. Waikohu
31. Cook
32. Wairoa
33. Hawke's Bay
34. Waipawa
35. Patangata
36. Waipukurau
37. Dannevirke
38. Woodville
39. Clifton
40. Taranaki
41. Inglewood
42. Stratford
43. Egmont
44. Eltham
45. Waimate West
46. Hawera
47. Patea
48. Waimarino
49. Waitotara
50. Wanganui
51. Rangitikei
52. Kiwitea
53. Pohangina
54. Oroua
55. Manawatu
56. Kairanga
57. Horowhenua
58. Hutt
59. Pahiatua
60. Akitio
61. Eketahuna
62. Masterton
63. Wairapa South
64. Featherston



# SOUTH ISLAND COUNTIES



## SOUTH ISLAND COUNTIES

- |                   |                     |
|-------------------|---------------------|
| 65. Marlborough   | 89. Akaroa          |
| 66. Awatere       | 90. Chatham Islands |
| 67. Kaikoura      | 91. Wairewa         |
| 68. Golden Bay    | 92. Ellesmere       |
| 69. Waimea        | 93. Ashburton       |
| 70. Buller        | 94. Geraldine       |
| 71. Inangahua     | 95. Levels          |
| 72. Grey          | 96. Mackenzie       |
| 73. Westland      | 97. Waimate         |
| 74. Amuri         | 98. Waitaki         |
| 75. Cheviot       | 99. Waihemo         |
| 76. Waipara       | 100. Waikouaiti     |
| 77. Kowai         | 101. Peninsula      |
| 78. Ashley        | 102. Taieri         |
| 79. Rangiora      | 103. Bruce          |
| 80. Eyre          | 104. Clutha         |
| 81. Oxford        | 105. Tuapeka        |
| 82. Tawera        | 106. Maniototo      |
| 83. Malvern       | 107. Vincent        |
| 84. Paparua       | 108. Lake           |
| 85. Waimairi      | 109. Southland      |
| 86. Heathcote     | 110. Wallace        |
| 87. Halswell      | 111. Fiord          |
| 88. Mount Herbert | 112. Stewart Island |



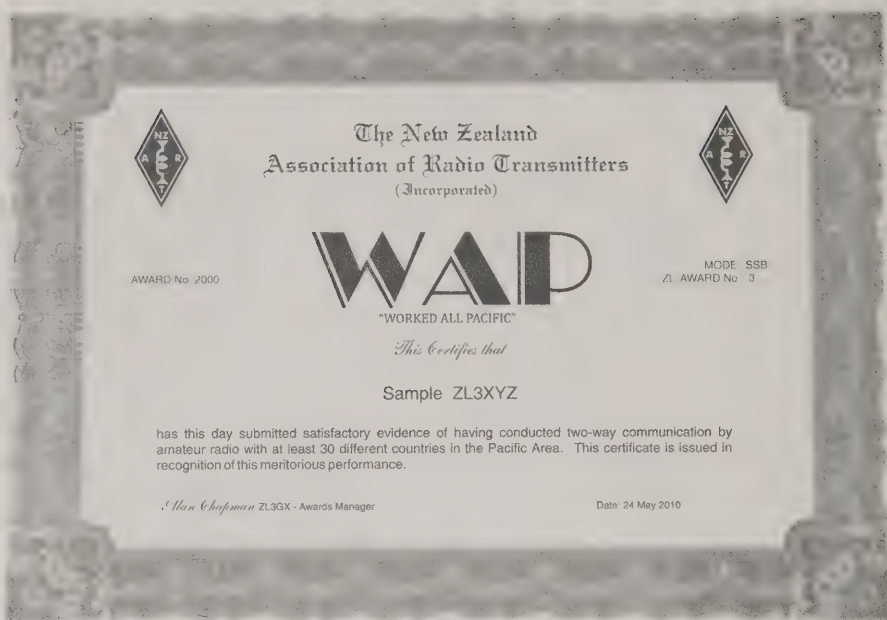
## OTC AWARD

### Rules for the Award

Ten contacts with OTC (ZL) members, each contact worth one point, Phone or CW with an upgrade of 50 points.

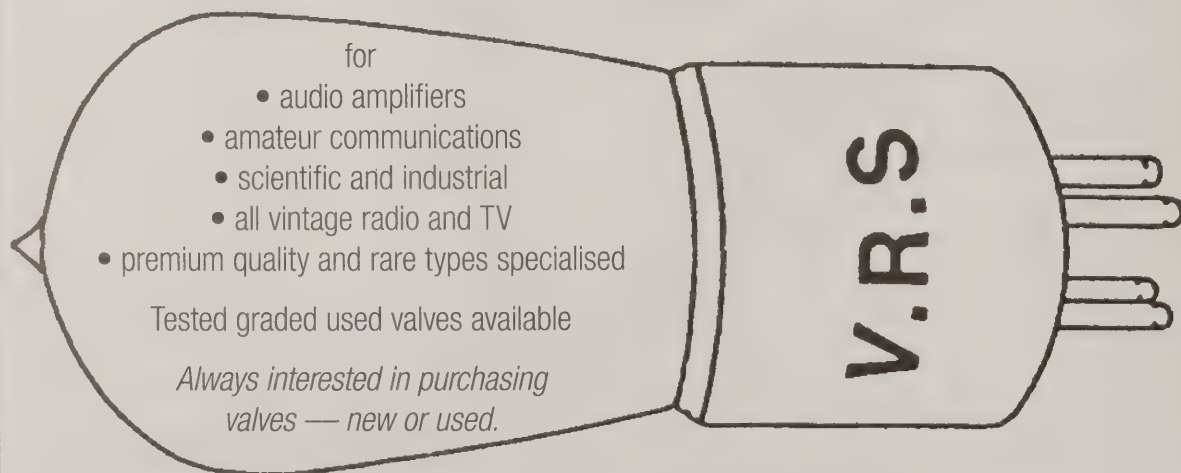
The information required on each contact is: call-sign, date, time, name and OTC number. Contacts must be on or after launch date 8 December 1995.

Logs with remittance of \$5.00 or IRC's to OTC Award Manager, 25 Annandale Street, New Plymouth 4310. Note that points may not be gained on the OTC National Net on Monday evenings.



## VALVE RADIO SPARES

Importers and stockists of quality valves of all types and related items



Geoff Edwards 12 Oxford St Lyttelton 8082  
ph 0274 338452 or 03 3289208 fax 03 3289207 email tubehead@xtra.co.nz

# FIXED LOCATION STATIONS

Updated as at 13 August 2012

## Notes to Tables and Maps:

The engineering details in these tables are from the RSM's SMART Database © RSM. Additions and modifications to the engineering details are only possible by making a licence application. Contact NZART FMTAG for more details: [fntag@nzart.org.nz](mailto:fntag@nzart.org.nz)

## Note on update status:

N in the Trustee 1 column indicates that the Branch has not responded, by the cut-off date, to the July 2012 FMTAG information update request.

## Note on repeater input/output offsets:

- 6m Repeater – User transmits 1 MHz lower
- 2m Repeater – User transmits 600 kHz lower for repeater output frequencies of 145.325 to 147.000 MHz  
600 kHz higher for for repeater output frequencies of 147.025 to 147.375 MHz
- 70cm Repeater - User transmits 5 MHz lower for 438.xxx and 439.xxx MHz  
5 MHz higher for 433.xxx and 434.xxx MHz
- 23cm Repeater – User transmits 20 MHz lower (except Mt. Victoria) Map Ref N89

## Note on National System Repeater input/output offsets:

User transmits 5 MHz high to a repeater having an output frequency of 434.xxx MHz. Vertical polarisation.  
User transmits 5 MHz low to a repeater having an output frequency of 439.xxx MHz. Vertical polarisation.

## Note on STSP Repeaters:

Most Branches have cancelled their individual STSP Licences, and are now taking advantage of MED Licence 209732.

## CONDITIONS OF LICENCE 209732:

Transmit Frequencies: 146.675, 146.725, 146.825, 146.875, 146.925, 438.625, 438.675, 438.725, 438.750, 438.775 MHz. Standard input/output frequency offsets.

17 dBW (50 Watts) maximum e.i.r.p.

STSP repeaters must not cause interference to other licensed services.

Only STSP repeaters are permitted under this licence.

The maximum permitted operating duration is 14 days.

The minimum inter-antenna spacing, between the STSP repeater antenna and the antenna of any other communications service, is 50 metres; otherwise ALL NEW ZEALAND.

# SIMPLEX AND CALLING FREQUENCIES

144.100	Oceania SSB Calling
144.200	NZ SSB Calling
144.500	FM Calling
144.550	Narrow digital mode simplex of up to 16 kHz bandwidth
144.575	Data Simplex and APRS
144.600	Primary data/packet port linked to Digital National System
144.625	Secondary data/packet port linked to Digital National System
144.650	Primary local data/packet store/forward
144.675	Secondary local data/packet store/forward
144.700	Voice-over Internet Simplex
145.250	Narrow band picture modes: FAX, Hellschreiber, SSTV, etc.
146.425 to 146.600	FM Simplex
147.400 to 147.475	FM Simplex
147.500	Tertiary local data/packet store/forward
147.525 to 147.600	FM Simplex
432.200	SSB Calling
432.500	FM Calling
432.550	Narrow digital mode simplex of up to 16 kHz bandwidth
432.575	Data Simplex and APRS
432.600	Primary data/packet port linked to Digital National System
432.625	Secondary data/packet port linked to Digital National System
432.650	Primary local data/packet store/forward
432.675	Secondary local data/packet store/forward
432.700	Voice-over Internet Simplex
438.300	Tertiary local data/packet store/forward
1294.125	Wide digital mode simplex of up to 250 kHz bandwidth

Above 432 MHz use the following as a guide to designated frequencies:

F to F+1 MHz for standard narrow band or weak signal segment, Where F = 432, 621, 925, 1296, 2424, 3399, 5760, 10368, 24192, 47088, 80640 MHz.

F+0.200	SSB Calling
F+0.250 to 0.300	Beacons (geographic plan, 1 kHz spacing)
F+0.500	FM Calling
F+0.550	Narrow digital mode simplex of up to 16 kHz bandwidth
F+0.575	Data Simplex and APRS
F+0.600	Primary data/packet port linked to Digital National System
F+0.625	Secondary data/packet port linked to Digital National System
F+0.650	Primary local data/packet store/forward
F+0.675	Secondary local data/packet store/forward
F+0.700	Voice-over Internet Simplex



# FIXED LOCATION STATIONS

Updated as at 13 August 2012

## National Beacons

Refer to map opposite for Reference No. locations

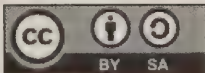
Beacons shown with a Repeater Ref No. are at the same location as the repeater

Map Ref	Station Name	Frequency/Location	TOPO50 MapRef	Branch	Trustee 1	Trustee 2	Call-sign	Modulation	EIRP (w)	Tx Pwr	Antenna Type	V/H & Direction
B01	Muriwai 5 cm	5765.0000 MURIWAI	BA30 288209	74	ZL1TBG	ZL1AVZ	ZL1SHF	FM/Id-FSK?	200			
B02	Auckland 2 m	144.2530 NIHOTUPU	BA31 402115	66	ZL1JD	ZL1TPH	ZL1VHF	CW	50	6	X Dipole	H omni
B02	Auckland 70 cm	432.2530 NIHOTUPU	BA31 402115	66	ZL1JD	ZL1TPH	ZL1UHF	CW	50			H
B03	Auckland 23 cm	1296.2530 KLONDYKE	BC32 602642	66	ZL1TGC	ZL1TND		CW				
B04	Waikato 2 m	144.2600 HAMILTON	BD33 009152	81	ZL1THG	ZL1UG	ZL1VHW	FSK	100	20	Cloverleaf	H omni
B04	Waikato 70 cm	432.2600 HAMILTON	BD33 009152	81	ZL1THG	ZL1UG	ZL1VHW	FSK	100	15		H
B04	Waikato 23 cm	1296.2600 HAMILTON	BD33 009152	81	ZL1THG	ZL1UG	ZL1VHW	FSK	25	10	Cloverleaf	H omni
B05	Waikato 12 cm	2424.2600 TAKAURUNGA	BD36 582034	81	ZL1THG	ZL1UG	ZL1VHW	CW	100	1	Double Quad	H NW
B06	New Plymouth 2 m	145.2250 OTARA OA ROAD	BH30 132751	27	ZL2BR	ZL2BZH	ZL2VHT	FSK	10			?
B06	New Plymouth 70 cm	432.2250 OTARA OA ROAD	BH30 132751	27	ZL2BR	ZL2BZH	ZL2VHT	FSK	10			?
B07	Waipuna 6 m	50.0240 WAIPUNA	B133 890298		ZL2WHO			CW	800		Dipole	H
B08	Hawkes Bay 6 m	51.0300 LATHAM ST	BK39 354197	25	ZL2TC	ZL2DW	ZL2MHB	AFSK	10		Turnstile	H
B08	Hawkes Bay 2 m	145.2400 LATHAM ST	BK39 354197	25	ZL2TC	ZL2DW	ZL2MHB	AFSK	10	6	Dipole	V
B09	Upper Hutt 10 m	28.2290 MT CLIMIE	BP33 801431	63	ZL2BRG	ZL2HM	ZL2MHF	CW/FSK?	50	10	Dipole	V
B09	Upper Hutt 6 m	52.2750 MT CLIMIE	BP33 801431	63	ZL2BRG	ZL2HM	ZL2MHF	CW/FSK?	50	10	odB Whip	V
B10	IBP, NCDX	14.1000 GLADSTONE ROAD	BP34 181532	46	ZL2BFY		ZL6B	CW	100			V
B10	IBP, NCDX	18.1100 GLADSTONE ROAD	BP34 181532	46	ZL2BFY		ZL6B	CW	100			V
B10	IBP, NCDX	21.1500 GLADSTONE ROAD	BP34 181532	46	ZL2BFY		ZL6B	CW	100			V
B10	IBP, NCDX	24.9300 GLADSTONE ROAD	BP34 181532	46	ZL2BFY		ZL6B	CW	100			V
B10	IBP, NCDX	28.2000 GLADSTONE ROAD	BP34 181532	46	ZL2BFY		ZL6B	CW	100			V
B11 (N87)	Hawkins Hill 2 m	144.2750 HAWKINS HILL	BQ31 450237	74	ZL3TC	ZL2TVM	ZL2UHF	CW	25	22	Dipole	H
B11 (N87)	Hawkins Hill 70 cm	432.2750 HAWKINS HILL	BQ31 450237	74	ZL3TC	ZL2TVM	ZL2UHF	CW	25	5	Dipole	H
B11 (N87)	Hawkins Hill 23 cm	1296.2750 HAWKINS HILL	BQ31 450237	74	ZL3TC	ZL2TVM	ZL2UHF	CW	25			H
B12	Lower Hutt 32 cm	925.2750 LOWER HUTT	BQ32 576362	74	ZL2TAR		ZL2UHF	FM	25			V
B13	Lower Hutt 12 cm	2402.2750 BIRCH ST	BQ32 611359	18	ZL2TVM	ZL2TWS	ZL2UHV	CW	60	.04		H
B14	Blenheim 6 m	52.4900 WITHER HILLS	BR28 821999	22	ZL2BK	ZL2BJV	ZL2SIX	CW	31			V
B15	Greymouth 6 m	50.0525 GREYMOOUTH	BT19 532986	49	ZL3TY	ZL3ADH	ZL3MHB	CW	31			V
B16	Hokitika 2 m	144.2860 HOKITIKA	BU18 327684	49	ZL3TY	ZL3ADH	ZL3MHB	CW	25			H
B17	Christchurch 2 m	144.2850 GALBRAITH AVENUE	BX24 732818	05	ZL3RX	ZL3VP	ZL3VHF	CW	40			V
B17	Christchurch 70 cm	432.2850 GALBRAITH AVENUE	BX24 732818	05	ZL3RX	ZL3VP	ZL3UHF	CW	40			V
B18	Rolleston RWY	28.2280 ROLLESTON RAILWAY STATION	BX23 503737		ZL3ADT		ZL3TEN	CW	10			V
B18	Rolleston RWY	50.0400 ROLLESTON RAILWAY STATION	BX23 503737		ZL3ADT		ZL3SIX	CW	100		Dipole	H

# NATIONAL BEACONS

~ Refer to Table Opposite for details

The Reference numbers are generally numbered North to South.



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 Information as at August 2012



# FIXED LOCATION STATIONS

Updated as at 13 August 2012

## National System Repeaters

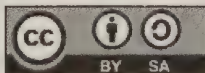
Refer to map opposite for Reference No. locations:

Repeater Type	Station Name	Frequency	Location	Topo50 MapRef	Branch	Trustee 1	Trustee 2	Notes	Map Ref
NSR	Doubtless Bay 490	434.900	RANGIAWHIA RANGE	AU26 356416	78	N	N		N01
NSR	Bay of Islands 9975	439.975	MANGINANGINA	AV28 735034	84	ZLIIU	ZLIRS		N04
NSR	Whangarei 9925	439.925	PARAHAKI	AX30 211471	28	ZLITX	ZLBSW		N06
NSR	Brynderwyn 495	434.950	PILBROW HILL	AY30 277076	28	ZLITX	ZLIDTE		N07
NSR	Mercury Bay 480	434.800	OPITO BAY	BA35 514314	85	N	N		N17
NSR	Auckland 9875	439.875	KLONDYKE	BC32 602642	66	ZLITGC	ZLITND		N23
NSR	Hamilton 9975	439.975	HAMILTON	BD33 027103	81	ZLITAT	ZLITHG		N28
NSR	Kaimai 485	434.850	TAKAURUNGA	BD36 582034	81	ZLIGWP	ZL3GR		N33
NSR	Rotorua 9925	439.925	WHAKAPOUNGAKAU	BE37 979784	33	ZLIPJ	ZL1BWC		N42
NSR	Edgecumbe 9975	439.975	MT EDGECUMBE	BE39 277759	67	ZL1CAY	ZL1OW		N45
NSR	Rangitoto 9925	439.925	RANGITOTO	BF34 110510	55	ZL4SQ	ZL1HJ		N48
NSR	Taupo 9825	439.825	MAROANUI	BF36 634324	74	ZL2KG	ZL1BU		N49
NSR	Gisborne 9875	439.875	WHAKAPUNAKE	BH42 992917	11	ZL2TRG	ZL2HC		N59
NSR	Egmont 490	434.900	MT EGMONT	BJ29 935505	74	ZL2KG	ZL4JY		N62
NSR	Hawkes Bay 485	434.850	MT ERIN	BK39 291940	25	ZL2TC	ZL2DW		N68
NSR	Wanganui 9875	439.875	LANDGUARD	BL32 730750	48	ZL1BNB	ZL2THO		N72
NSR	Wharite 9975	439.975	WHARITE	BM35 429399	74	ZL2KG	ZL4JY		N75
NSR	Kapiti 9925	439.925	MT FIELD	BP32 775757	69	ZL2GO	ZL4VV		N81
NSR	Wairarapa 495	434.950	PARIWHARIKI TRIG	BP35 289460	46	ZL2BA	ZL4JS		N84
NSR	Belmont 9875	439.875	MT BELMONT	BQ32 569399	74	ZL3TC	ZL2TVM		N91
NSR	Nelson 9925	439.925	GRAMPIANS	BQ26 234283	26	ZL2BCA	ZL2RP		S05
NSR	Westport 9975	439.975	DENNISTON	BR21 003782	62	ZL2BCA	ZL3DU		S12
NSR	Murchison 495	434.950	MT MURCHISON	BR23 583801	26	ZL2BCA	ZL2RP		S14
NSR	Greymouth 9875	439.875	SEWELL PEAK	BT19 636036	49	ZL3TY	ZL3ADH		S18
NSR	Blue Duck 485	434.850	BLUE DUCK	BT28 653275	05	ZL3RX	ZL3VP		S21
NSR	Christchurch 9875	439.875	MARLEYS HILL	BX24 704714	05	ZL3RX	ZL3VP		S26
NSR	Waitaki 490	434.900	MT STUDHOLME	CA18 353531	34	ZL3OZ	ZL3GL		S33
NSR	Dunedin 9925	439.925	MT CARGILL	CE17 101239	30	ZL4JH	ZL4GR		S42
NSR	Balclutha 485	434.850	MT STUART	CF15 504924	35	ZL4AS	ZL4TL		S48

# NATIONAL SYSTEM REPEATERS

- Refer to Table Opposite for details

The Reference numbers are generally numbered North to South.



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 Information as at August 2012



# FIXED LOCATION STATIONS

Updated as at 13 August 2012

**North Island 2m and Linked 70cm Repeaters except for Wellington – Wairarapa areas**  
**Refer to map opposite for Reference No. locations:**

Repeater Type	Station Name	Frequency	Location	Topo50 MapRef	Branch	Trustee 1	Trustee 2	Notes	Map Ref
2m	Doubtless Bay 7225	147.225	RANGLAWHIA RANGE	AU26 356416	78	N	N	Link FN710	N01
2m	Akatere 6775	146.775	AKATERE	AU28 606261	78	N	N	Link FN710	N02
2m	Far North 710	147.100	MAUNGATAUREIA	AV27 432083	78	N	N	Multi-Link	N03
2m	Bay of Islands 675	146.750	MANGINANGINA	AV28 735034	84	ZL1IU	ZL1RS		N04
2m	Whangarei 665	146.650	PARAKIORE	AX30 160532	28	ZL1TX	ZL1BSW		N05
2m	Whangarei Data 5425	145.425	PARAHAKI	AX30 211471	28	ZL1TX	ZL1TOB		N06
2m	Brynderwyn 560	145.600	PILBROW HILL	AY30 277076	28	ZL1TX	ZL1DTE		N07
2m	Rodney 730	147.300	POHUEHUE	AZ31 475626	71	ZL2BCB	ZL2MR		N08
2m	Auckland 670	146.700	RUAOTUWHENUA	BA31 383125	66	ZL1TGC	ZL1TND		N09
2m	Auckland 5775	145.775	MUSICK POINT	BA32 695203	86	ZL1BFB	ZL1KFM		N14
2m	Mercury Bay 7075	147.075	KAKATARAHAIE	BA34 280138	85	N	N	Link TA6975	N16
2m	Ponga 7325	147.325	PONGA HILL	BB32 782912	86	ZL1BFB	ZL1KFM		N19
2m	Auckland 690	146.900	MT PUKETUTU	BB32 795816	66	ZL1JD	ZL1UET		N20
2m	Tairua 6975	146.975	TAIRUA LOOKOUT	BB35 505046	85	N	N	Link MB7075	N22
2m	Auckland Data 5625	145.625	KLONDYKE	BC32 602642	66	ZL1TGC	ZL1TND		N23
2m	Auckland D-STAR 565	145.650	KLONDYKE	BC32 602642	66	ZL1HCU	ZL1TGC		N23
2m	Auckland 6625	146.625	KLONDYKE ROAD	BC32 602642	66	ZL1TGC	ZL1TND		N23
2m	Raglan 5575	145.575	MAUNGAKAWA	BC34 120565	81	ZL1TAT	ZL1THG		N24
2m	Raglan 5675	145.675	TE UKU	BD32 733067	81	ZL1TAT	ZL1THG		N25
2m	Hamilton Voice & D-STAR	145.350	HAMILTON	BD33 008155	83	ZL1HN	ZL1AT		N27
2m	Hamilton 7125	147.125	HAMILTON	BD33 031129	89	ZL1PO	ZL1SAD		N29
2m	Waikato 695	146.950	TE WERAITI	BD36 558103	81	ZL1TAT	ZL1THG		N32
2m	Kaimai Data 540	145.400	TAKAURUNGA	BD36 582034	81	ZL1GWP	ZL3GR		N33
2m	Tauranga 680	146.800	MINDEN	BD36 692218	39	ZL1TAJ	ZL1BVA		N34
2m	Hairini 7225	147.225	PUAHUE ROAD	BE34 075892	55	ZL4SQ	ZL1HJ		N37
2m	Maungapikopiko 7025	147.025	TECT ALL TERRAIN	BE36 749969	88	ZL1MK	ZL1IE		N38
2m	Te Puke 7175	147.175	SHAW ROAD	BE37 870015	53	ZL1TAJ	ZL1MOF		N39
2m	Rotorua 735	147.350	MOERANGI	BE37 903691	33	ZL1PJ	ZL1BWC		N40
2m	Rotorua Linear 435	144.350	MOERANGI HEIGHTS	BE37 967778	33	ZL1PJ	ZL1BWC		N41
2m	Edgecumbe 700	147.000	PUTAUAKI	BE39 275759	67	ZL1CAY	ZL1OW		N44
2m	Whakatane 730	147.300	WHAKATANE	BE40 528888	51	ZL1NI	ZL1BCW		N46
2m	Arowhana 685	146.850	AROWHANA	BE43 262703	11	ZL2TRG	ZL2HC		N47
2m	Waitomo 7375	147.375	RANGITOTO	BF34 110510	55	ZL4SQ	ZL1HJ		N48
2m	Taupo 675	146.750	MAROANUI	BF36 634324	60	ZL1BU	ZL1KU		N49
2m	Taumarunui 715	147.150	MT HIKURANGI	BG33 998037	38	ZL1UTH	ZL1TIG		N50
2m	Poverty Bay 680	146.800	KAITI HILL	BG43 378069	11	ZL2TRG	ZL2HC		N52
2m	New Plymouth 720	147.200	ROBE STREET	BH29 928757	27	ZL2BR	ZL2BZH		N54
2m	Kakaramea 7275	147.275	KAKARAMEA	BH35 336825	38	ZL1UTH	ZL1TIG		N56
2m	Napier 725	147.250	TARAPONUI	BH38 233618	25	ZL2TC	ZL2DW		N57
2m	Gisborne 690	146.900	WHAKAPUNAKE	BH42 992917	11	ZL2TRG	ZL2HC		N59
2m	Opunake 540	145.400	KIRI ROAD	BJ29 860396	87	N	N	Link EG705	N61
2m	Egmont 705	147.050	MT EGMONT	BJ29 952487	87	N	N	Link OP540	N63
2m	Wanganui 690	146.900	WANGANUI	BK32 755884	48	ZL1BNB	ZL2THO		N64
2m	Taihape 6775	146.775	MATAROA	BK35 344024	23	ZL2BHX	ZL3DC		N65
2m	Hawkes Bay 670	146.700	KAHURANAKI	BK39 316877	13	ZL2AJ	ZL2DW		N69
70cm	Hawkes Bay 870	438.700	TE MATA	BK39 348987	13	ZL2AJ	ZL2DW	Link WH665	N70
2m	Manawatu 5725	145.725	PAHIATUA TRACK	BM35 316240	20	ZL2FX	ZL2AJ		N74
2m	Manawatu 7125	147.125	PAHIATUA TRACK	BM35 316240	20	ZL2FX	ZL2AJ		N74
2m	Wharite 665	146.650	WHARITE	BM35 430401	06	ZL2KG	ZL4SJ	Link HB870	N76
70cm	Wharite Voice & Data 960	439.600	WHARITE 2XS	BM35 431399	06	ZL2KG	ZL4SJ	Link TA5625	N77
2m	Kapiti Voice & Data 535	145.350	MT FIELD	BP32 775757	69	ZL2GO	ZL4VV		N81
2m	Kapiti 685	146.850	MT FIELD	BP32 775757	69	ZL2GO	ZL4VV		N81
2m	Masterton 680	146.800	RANGITUMAU	BP35 307749	46	ZL2BA	ZL4JS		N85
2m	Rewa 735	147.350	REWA	BP35 507506	46	ZL2BA	ZL4JS		N86
2m	Tararua Voice & Data	145.625	MT BUTTERS	BN36 572057	06	ZL2KG	ZL4SJ	Link WH960	N90
2m	Belmont 710	147.100	MT BELMONT	BQ32 569399	74	ZL3TC	ZL3TVM		N91
2m	Southern Wairarapa 715	147.150	THE KNOLL	BQ33 026387	82	ZL2BLM	ZL2SJ		N94

# North Island 2m and Linked 70cm Repeaters - Refer to Table Opposite for details

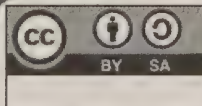
REPEATERS ARE LINKED

The Reference numbers are generally numbered North to South.

Linked repeaters are connected by dotted lines.



Refer to the Wellington and Wairarapa Area on a separate detail.



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Information as at August 2012



# FIXED LOCATION STATIONS

## Updated as at 13 August 2012

**North Island 70cm and Linked 2m Repeaters except for Wellington – Wairarapa areas**  
**Refer to map opposite for Reference No. locations:**

Repeater Type	Station Name	Frequency	Location	Topo50 MapRef	Branch	Trustee 1	Trustee 2	Notes	Map Ref
2m	Tararua Voice & Data	145.625	MT BUTTERS	BN36 572057	O6	ZL2KG	ZL4SJ	Link WH960	N90
2m	Wharite 665	146.650	WHARITE	BM35 430401	O6	ZL2KG	ZL4SJ	Link HB870	N76
70cm	Wairarapa 3825	433.825	PARIWHARIKI TRIG	BP35 289460	46	ZL2BA	ZL4JS		N84
70cm	Taraponui 405	434.050	TARAPONUI	BH38 233618	25	ZL2TC	ZL2DW		N57
70cm	Auckland D-STAR 8175	438.175	KLONDYKE	BC32 602642	66	ZL1ICU	ZL1TGC		N23
70cm	Ponga 825	438.250	PONGA HILL PAKAKURA	BB32 782912	86	ZL1BFB	ZL1KFM		N19
70cm	North Shore Digi 830	438.300	NORTH SHORE	BA31 555317	29	ZL1AUW	ZL1TGC		N12
70cm	Auckland 845	438.450	KLONDYKE	BC32 602642	66	ZL1TGC	ZL1TND		N23
70cm	New Plymouth 8475	438.475	CARRINGTON ROAD	BH29 873616	27	ZL2BR	ZL2BZH		N53
70cm	Auckland 850	438.500	NORTH HEAD	BA32 616227	66	ZL1TGC	ZL1TND		N13
70cm	Manawatu 8525	438.525	PAHIATUA TRACK	BM35 316240	20	ZL2FX	ZL2AJ		N74
70cm	Te Puke 855	438.550	SHAW ROAD	BE37 870015	53	ZL1TAJ	ZL1MOF		N39
70cm	Manurewa 8575	438.575	MANUREWA	BB32 701047	86	ZL1UET	ZL1BFB		N18
70cm	Hunua 860	438.600	GILLESPIE ROAD	BB33 805921		ZL1BNQ			N21
70cm	Climie Voice Data & D-STAR	438.600	MT CLIMIE	BP32 799424	63	ZL2BRG	ZL2HM		N82
70cm	Taihape 865	438.650	CLEAVERS HILL	BK35 355211	23	ZL2BHX	ZL3DC		N67
70cm	Whangarei 870	438.700	PARAHAKI	AX30 211471	28	ZL1TX	ZL1BSW		N6
70cm	Waitomo 870	438.700	RANGITOTO	BF34 110510	55	ZL4SQ	ZL1HJ		N48
70cm	Hawkes Bay 870	438.700	TE MATA	BK39 348987	13	ZL2AJ	ZL2DW	Link WH665	N70
70cm	Egmont 880	438.800	MT EGMONT	BJ29 952487	87	N	N		N63
70cm	Tauranga 885	438.850	PAPAMOA	BD37 895185	39	ZL1TAJ	ZL1BVA		N36
70cm	Kapiti 885	438.850	MT FIELD	BP32 775757	69	ZL2GO	ZL4VV		N81
70cm	Hamilton 8875	438.875	HAMILTON	BD33 031129	89	ZL1PO	ZL1SAD		N29
70cm	Hawkes Bay 9175	439.175	CLIFTON TRIG	BK39 440042	13	ZL2AJ	ZL2DW		N71
70cm	Hamilton Voice & D-STAR	439.425	HAMILTON	BD33 008155	83	ZL1HN	ZL1AT		N27
70cm	Te Kapua 950	439.500	TE KAPUA	BG43 242289		ZL2CC			N51
70cm	Auckland D-STAR 9575	439.575	MUSICK POINT	BA32 696201	86	ZL1WOT	ZL1BFB		N15
70cm	Wharite Voice & Data 960	439.600	WHARITE 2XS	BM35 431399	O6	ZL2KG	ZL4SJ	Link TA5625	N77

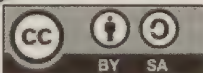
# North Island 70cm and Linked 2m Repeaters - Refer to Table Opposite for details

Information supplied by the New Zealand Association of Radio Transmitters

The Reference numbers are generally numbered North to South.

Linked repeaters are connected by dotted lines.

Refer to the Wellington and Wairarapa Area on a separate detail.



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Information as at August 2012



# FIXED LOCATION STATIONS

## Updated as at 13 August 2012

**North Island 6m 23cm APRS/BB/Digi ATV and STSP Repeaters.**  
**Refer to map opposite for Reference No. locations:**

Repeater Type	Station Name	Frequency	Location	Topo50 MapRef	Branch	Trustee 1	Trustee 2	Notes	Map Ref
APRS/BB/Digi	Western Suburbs	144.575	WHAU BRIDGE RESERVE	BA31 508136	03	ZL1NE	ZL1RCA		N10
23cm	Auckland 190	1291.900	GLENFIELD	BA31 538263	66	ZL1TGC	ZL1JD		N11
APRS/BB/Digi	North Shore	144.600	NORTH SHORE	BA31 555317	29	ZL1AUW	ZL1TGC		N12
6m	Auckland 3725	53.725	KLONDYKE ROAD	BC32 602642	66	ZL1TGC	ZL1TND		N23
STSP	STSP	145.325	SEDDON ROAD	BD33 006 165	12	ZL2MGS	ZL1UPJ	Retained Individual STSP Lic	N26
APRS/BB/Digi	Hamilton	144.650	SEDDON ROAD	BD33 1000157	12	ZL1PK	ZL1GWP		N30
APRS/BB/Digi	Pukemoremore	144.575	PUKEMOREMORE	BD34 202128		ZL1KM			N31
APRS/BB/Digi	Te Puke	144.625	TOTARA STREET	BD37 810268	53	ZL1MOF	ZL1TAJ		N35
APRS/BB/Digi	Makatiti	144.575	MAKATITI DOME	BE38 039731	33	ZL1BTB	ZL1BWC		N43
APRS/BB/Digi	Waitomo	144.650	RANGITOTO	BF34 110510	81	ZL1GWP	ZL1AMW		N48
APRS/BB/Digi	Taupo	144.575	MAROANUI	BF36 634324	60	ZL1BU	ZL1KU		N49
APRS/BB/Digi	Te Kapua	144.575	TE KAPUA	BG43 242289		ZL2CC			N51
APRS/BB/Digi	Kururau	144.575	KURURAU ROAD	BH33 912938	60	ZL1UTH	ZL1BU		N55
APRS/BB/Digi	Hawkes Bay	144.575	TARAPONUI	BH38 233618	13	ZL2AJ	ZL2DW		N57
APRS/BB/Digi	Te Ahioateatua	144.575	TE AHIOTEATUA	BH41 739910	13	ZL2AJ	ZL2DW		N58
APRS/BB/Digi	Gisborne	144.575	WHAKAPUNAKE	BH42 993916	11	ZL2TRG	ZL2HC		N60
APRS/BB/Digi	Nataroa	144.575	MATAROA	BK35 346016	20	ZL2FX	ZL2AJ		N66
APRS/BB/Digi	Kauahei	144.575	KAUAHEI	BL38 166828		ZL2AJ			N73
APRS/BB/Digi	Manawatu	144.575	PAHIATUA TRACK	BM35 316240	20	ZL2FX	ZL2AJ		N74
APRS/BB/Digi	Te Awaputahi	144.575	TE AWAPUTAHU	BM37 931238	13	ZL2AJ	ZL2DW		N78
APRS/BB/Digi	Kapiti	144.650	MT FIELD	BP32 775757	69	ZL2GO	ZL4VV		N81
23cm	Cl;imie 200	1292.000	MT CLIMIE	BP32 799424	63	ZL2BRG	ZL2HM		N82
APRS/BB/Digi	Wairarapa	144.575	PARIWHARIKI TRIG	BP35 289460	46	ZL2BA	ZL4JS		N84
APRS/BB/Digi	Kaiwharawhara Hill	144.575	KAIWHARAWHARA HILL	BQ31 495316	74	ZL2HD	ZL3TC		N88
23cm	Mt Victoria 120	1271.200	MT VICTORIA	BQ31 504269	74	ZL3TC	ZL4JY		N89

North Island 6m 23cm APRS/BD/DIGI ATV and STSP repeaters - Refer to Table Opposite for details



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# FIXED LOCATION STATIONS

## Updated as at 13 August 2012

### South Island 2m and 70cm Repeaters

Refer to map opposite for Reference No. locations:

Repeater Type	Station Name	Frequency	Location	Topo50 MapRef	Branch	Trustee 1	Trustee 2	Notes	Map Ref
2m	Motueka 670	146.700	MT CAMPBELL	BP24 876475	24	ZL2BCG	ZL2ASF		S02
2m	Golden Bay 7375	147.375	TAKAKA HILL	BP25 883587	24	ZL2BCG	ZL2VBO	Link BL695	S03
2m	Nelson 7025	147.025	GRAMPIANS	BQ26 234283	26	ZL2BCA	ZL2RP		S05
70cm	Nelson 890	438.900	FRINGED HILL	BQ26 266270	26	ZL2BCA	ZL2RP		S06
2m	Nelson 720	147.200	SADDLE HILL	BQ27 362306	26	ZL2BCA	ZL2RP		S08
70cm	Blenheim 845	438.450	TUAMARINA	BQ28 784163	22	ZL2BK	ZL2BJV		S10
2m	Picton 7225	147.225	MT FREETH	BQ28 824286	22	ZL2BK	ZL2BJV	Link BL695	S11
2m	Westport 675	146.750	MILLERTON	BR21 050901	62	ZL2BCA	ZL3DU		S13
2m	Murchison 680	146.800	MT MURCHISON	BR23 583801	26	ZL2BCA	ZL2RP		S14
2m	Blenheim 695	146.950	THE NED	BR28 767893	22	ZL2BK	ZL2BJV	Multi-Link	S15
2m	Ward 560	145.600	WELD CONE	BS29 972665	22	ZL2BK	ZL2BJV	Link BL695	S17
2m	Greymouth 695	146.950	SEWELL PEAK	BT19 636036	49	ZL3TY	ZL3ADH		S18
70cm	Greymouth 8575	438.575	SEWELL PEAK	BT19 636036	49	ZL3TY	ZL3ADH	Link NC6975	S18
2m	Kaikoura 690	146.900	KAIKOURA	BT27 573033	22	ZL2BK	ZL2BJV		S20
2m	North Canterbury 6975	146.975	MT NOBLE	BV23 502536	68	ZL4WX	ZL3AKZ	Link GR8575	S22
2m	Mount Grey 675	146.750	MT GREY	BW23 632256	68	ZL3QR	ZL4FZ		S23
2m	Canterbury 5625	145.625	CASS PEAK	BX24 697684	CARDS	ZL2BCF	ZL3TMB	Link TE680	S24
70cm	Cass Peak 850	438.500	CASS PEAK	BX24 697684	56	N	N		S24
2m	Christchurch 705	147.050	MARLEYS HILL	BX24 704714	O5	ZL3RX	ZL3VP		S26
70cm	Christchurch 840	438.400	MARLEYS HILL	BX24 705712	CA	ZL3MJS	ZL3TMB		S27
2m	Canterbury 725	147.250	HERBERT PEAK	BX24 792627	O5	ZL3RX	ZL3VP		S30
2m	Tekapo 680	146.800	MT ROLLESBY	BZ17 092075	34	ZL3OZ	ZL3GL	Link CP5625	S32
2m	Waitaki 695	146.950	MT STUDHOLME	CA18 353531	34	ZL3OZ	ZL3GL		S33
2m	Timaru 6625	146.625	MT HORRIBLE	CA19 460818	34	ZL3OZ	ZL3GL		S34
70cm	Timaru 885	438.850	MT HORRIBLE	CA19 460818	34	ZL3OZ	ZL3GL		S34
2m	Oamaru 670	146.700	STATION PEAK	CB17 073418	64	ZL4DB	ZL4SN		S35
2m	Queenstown 685	146.850	REMARKABLES	CC11 694014		ZL4JW		Link DN830	S36
70cm	Oamaru 865	438.650	CAPE WANBROW	CC18 405023	64	ZL4DB	ZL4SN		S37
2m	Alexandra 700	147.000	FRUITLANDS	CD13 043718	61	ZL4THT	ZL4GP		S38
70cm	Mosgiel 820	438.200	SADDLE HILL	CE16 957129	30	ZL4JH	ZL4GR	Link DN690	S39
70cm	Dunedin 915	439.150	RUDD ROAD	CE17 033204	30	ZL4JH	ZL4GR		S40
2m	Dunedin 690	146.900	MT CARGILL	CE17 101238	30	ZL4JH	ZL4GR	Link DN820	S41
2m	Dunedin 665	146.650	HIGHCLIFF	CE17 133163	30	ZL4JH	ZL4GR		S43
70cm	Dunedin 830	438.300	HIGHCLIFF	CE17 134163	30	ZL4JH	ZL4GR	Link QT685	S44
2m	Invercargill 680	146.800	BALD HILL	CF08 010743	37	ZL4OX	ZL4CSS		S45
2m	Gore 695	146.950	MCLEODS HILL	CF12 800932	O8	ZL4TCS	ZL4LC		S46
2m	Balclutha 675	146.750	KURIWAO	CF13 204730	35	ZL4TL	ZL4AS		S47
70cm	Invercargill 870	438.700	INVERCARGILL	CG10 434502	37	ZL4OX	ZL4CSS		S49
2m	Invercargill 5775	145.775	BLUFF HILL	CH10 432270	37	ZL4OX	ZL4CSS		S50

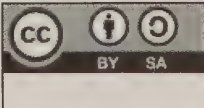
# South Island 2m and 70cm Repeaters

- Refer to Table Opposite for details

The Reference numbers are generally numbered North to South.



Linked repeaters are connected by dotted lines.



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Information as at August 2012



# FIXED LOCATION STATIONS

## Updated as at 13 August 2012

### South Island 6m 23cm APRS/BB/Digi ATV and STSP Repeaters

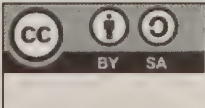
Refer to map opposite for Reference No. locations:

Repeater Type	Station Name	Frequency	Location	Topo50 MapRef	Branch	Trustee 1	Trustee 2	Notes	Map Ref
APRS/BB/Digi	Collingwood	144.575	MT BURNETT	BN24 696014		ZL2VBO	ZL2MTB		S01
ATV	Tasman Bay	615.250	MT CAMPBELL	BP24 876475	24	ZL2ASF	ZL2BCG		S02
APRS/BB/Digi	Nelson	144.575	TAKAKA HILL	BP25 883587	26	ZL2BCA	ZL2RP		S03
APRS/BB/Digi	Nelson	144.575	OBSERVATORY HILL	BQ26 213289	26	ZL2BCA	ZL2RP		S04
STSP	STSP	438.625	DODSON VALLEY	BQ26 270 345	26	ZL2BCA	ZL2RP	Retained Individual STSP Lic	S07
STSP	STSP	146.925	BLENHEIM	BQ28 759 086	22	ZL2BK	ZL2BJV	Retained Individual STSP Lic	S09
APRS/BB/Digi	Westport	144.575	DENNISTON	BR21 003782	62	ZL2BCA	ZL3DU		S12
APRS/BB/Digi	Murchison	144.575	MT MURCHISON	BR23 583801	26	ZL2BCA	ZL2RP		S14
APRS/BB/Digi	Marlborough	144.575	JAMIES KNOB	BR29 926969	22	ZL2BK	ZL2BJV		S16
APRS/BB/Digi	Greymouth	144.650	PAPAROA	BT19 636039	49	ZL3TY	ZL3ADH		S19
APRS/BB/Digi	Kaikoura	144.575	KAIKOURA	BT27 573033	22	ZL2BK	ZL2BJV		S20
6m	Cass Peak 385	53.850	CASS PEAK	BX24 697684	CARDS	ZL2BCF	ZL3TMB		S24
APRS/BB/Digi	Christchurch	144.575	MARLEYS HILL	BX24 701716	O5	ZL3RX	ZL3VP		S25
ATV	Christchurch	615.250	CHRISTCHURCH	BX24 706747	O5	ZL3TJH			S28
APRS/BB/Digi	Innes Road VOIP Simplex	144.700	INNES ROAD	BX24 710838		ZL3BCC			S29
APRS/BB/Digi	Innes Road VOIP Simplex	432.700	INNES ROAD	BX24 710838		ZL3BCC			S29
STSP	STSP	147.275	CHRISTCHURCH	BY21 005 386	O5	ZL3RX	ZL3VP	Retained Individual STSP Lic	S31
APRS/BB/Digi	Timaru	144.650	MT STUDHOLME	CA18 353531	34	ZL3OZ	ZL3GL		S33
APRS/BB/Digi	Timaru	144.575	MT HORRIBLE	CA19 460818	34	ZL3OZ	ZL3GL		S34
ATV	Oamaru	615.250	CAPE WANBROW	CC18 405023	64	ZL4DB	ZL4SN		S37
ATV	Oamaru	1282.000	CAPE WANBROW	CC18 405023	64	ZL4DB	ZL4SN		S37
6m	Alexandra 3625	53.625	FRUITLANDS	CD13 043718	61	ZL4THT	ZL4GP		S38

# South Island 6m 23cm APRS/BB/DIGI ATV and STSP repeaters – Refer to Table Opposite for details

Information as at August 2012

The Reference numbers are generally numbered North to South.



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# FIXED LOCATION STATIONS

## Updated as at 13 August 2012

### Wellington – Wairarapa Area Repeaters

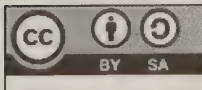
Refer to map opposite for Reference No. locations:

Repeater Type	Station Name	Frequency	Location	Topo50 MapRef	Branch	Trustee 1	Trustee 2	Notes	Map Ref
APRS/BB/Digi	Kaiwharawhara Hill	144.575	KAIWHARAWHARA HILL	BQ31 495316	74	ZL2HD	ZL3TC		N88
2m	Hawkins Hill Voice Data & P25	146.625	HAWKINS HILL	BQ31 450237	74	ZL3TC	ZL2TVM		N87
2m	Lower Hutt 700	147.000	MT FITZHERBERT	BQ32 644351	18	ZL2TVM	ZL2TWS		N93
2m	Belmont 710	147.100	MT BELMONT	BQ32 569399	74	ZL3TC	ZL3TVM		N91
2m	Southern Wairarapa 715	147.150	THE KNOLL	BQ33 026387	82	ZL2BLM	ZL2SJ		N94
2m	Barton 7325	147.325	MT BARTON	BR33 952969	46	ZL2BA	ZL4JS		N95
70cm	Kaiwhararara Hill Voice Data & P25	434.550	KAIWHARAWHARA HILL	BQ31 495316	74	ZL3TC	ZL2SX		N88
70cm	Lower Hutt 8425	438.425	BIRCH STREET	BQ32 611359	18	ZL2TVM	ZL2TWS		N92
70cm	Mt Victoria Voice & P25	439.500	MT VICTORIA	BQ31 504269	74	ZL3TC	ZL2TVM		N89
23cm	Mt Victoria 120	1271.200	MT VICTORIA	BQ31 504269	74	ZL3TC	ZL4JY		N89

# Wellington - Wairarapa Area Repeaters

- Refer to Table Opposite for details

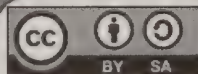
REPEATERS LOCATIONS



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# NEW ZEALAND AMATEUR RADIO VoIP SYSTEMS



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# NEW ZEALAND AMATEUR RADIO VoIP SYSTEMS



Echo-595683-ZL2ARG-L  
-Nelson-433.9MHz-S

IRLP-6081-ZL2KS-  
Blenheim-438.45MHz

IRLP-6285-ZL2KS-  
Blenheim-146.95MHz

Echo-101553-ZL3CAR-R -  
ChCh 840 Rptr -438.4MHz

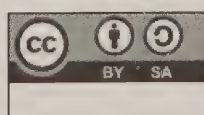
IRLP-6900-ZL3TMB-  
ChCh-145.625MHz

Echo-348111-ZL3REW-L -  
Ashburton 144.825 -144.825MHz

IRLP-6642-ZL4QS-  
Alexandra-146.525MHz

IRLP-6184-ZL4DM-Dunedin-146.65MHz  
IRLP-6507-ZL4JH-Dunedin-147.425MHz

IRLP-6397-ZL4AU-  
Invercargill-146.45MHz



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The NCDXF, in co-operation with the IARU, constructed and operates a worldwide network of high-frequency radio beacons on 14.100, 18.110, 21.150, 24.930 and 28.288 MHz. These beacons help both amateur and commercial high-frequency radio users assess the current condition of the ionosphere. The entire system is designed, built and operated by volunteers at no cost except the actual price of hardware components, shipping costs, and so on.

In principle, one can simply listen on the beacon frequencies and copy the CW call-signs of the various beacons to figure out where the band is open, but in practice, not every ham operator can copy calls at twenty-two words per minute and some beacons may be heard at too low a signal strength to catch the call. Because the beacons transmit at known times, it is easy to know which beacon one is hearing without actually copying the CW call-sign. Since the beacons are running 100 W to a vertical, even a weak beacon signal may indicate a path with excellent propagation for stations using higher power and directive antennas.

For the latest information see the NCDXF website at <<http://www.ncdxf.org/pages/beacons.html>>.

Table 1. NCDXF/IARU Beacon Transmission Schedule

As at August 2012.

This table gives the minute and second within each hour of the start of the first transmission of each of beacon on each frequency. Each transmission is repeated every three minutes. A transmission consists of the callsign of the beacon sent at 22 words per minute followed by four one-second dashes. The callsign and the first dash are sent at 100 watts. The remaining dashes are sent at 10 watts, 1 watt and 0.1 watts.

Slot	Country	Call	14.100	18.110	21.150	24.930	28.200	Operator
1	United Nations	4UIUN	00:00	00:10	00:20	00:30	00:40	UNRC
2	Canada	VE8AT	00:10	00:20	00:30	00:40	00:50	RAC/NARC
3	United States	W6WX	00:20	00:30	00:40	00:50	01:00	NCDXF
4	Hawaii	KH6WO	00:30	00:40	00:50	01:00	01:10	KH6BYU
5	New Zealand	ZL6B	00:40	00:50	01:00	01:10	01:20	NZART
6	Australia	VK6RBP	00:50	01:00	01:10	01:20	01:30	WIA
7	Japan	JA2IGY	01:00	01:10	01:20	01:30	01:40	JARL
8	Russia	RR90	01:10	01:20	01:30	01:40	01:50	SRR
9	Hong Kong	VR2B	01:20	01:30	01:40	01:50	02:00	HARTS
10	Sri Lanka	4S7B	01:30	01:40	01:50	02:00	02:10	RSSL
11	South Africa	ZS6DN	01:40	01:50	02:00	02:10	02:20	ZS6DN
12	Kenya	5Z4B	01:50	02:00	02:10	02:20	02:30	ARSK
13	Israel	4X6TU	02:00	02:10	02:20	02:30	02:40	IARC
14	Finland	OH2B	02:10	02:20	02:30	02:40	02:50	SRAL
15	Madeira	CS3B	02:20	02:30	02:40	02:50	00:00	ARRRM
16	Argentina	LU4AA	02:30	02:40	02:50	00:00	00:10	RCA
17	Peru	OA4B	02:40	02:50	00:00	00:10	00:20	RCP
18	Venezuela	YV5B	02:50	00:00	00:10	00:20	00:30	RCV

Table 2. NCDXF/IARU Beacon Locations

Slot	Country	Call	Location	Latitude	Longitude	Grids
1	United Nations	4UIUN	New York City	40° 45' N	73° 58' W	FN30as
2	Canada	VE8AT	Eureka, Nunavut	79° 59' N	85° 57' W	EQ79ax
3	United States	W6WX	Mt. Umunhum	37° 09' N	121° 54' W	CM97bd
4	Hawaii	KH6WO	Laie	21° 38' N	157° 55' W	BL11ap
5	New Zealand	ZL6B	Masterson	41° 03' S	175° 36' E	RE78tw
6	Australia	VK6RBP	Rollstone	32° 06' S	116° 03' E	OF87av
7	Japan	JA2IGY	Mt. Asama	34° 27' N	136° 47' E	PM84jk
8	Russia	RR90	Novosibirsk	54° 59' N	82° 54' E	NO14kx
9	Hong Kong	VR2B	Hong Kong	22° 16' N	114° 09' E	OL72bg
10	Sri Lanka	4S7B	Colombo	6° 6' N	80° 13' E	NJ06cc
11	South Africa	ZS6DN	Pretoria	25° 54' S	28° 16' E	KG44dc
12	Kenya	5Z4B	Kariobangi	1° 15' S	36° 53' E	KI88ks
13	Israel	4X6TU	Tel Aviv	32° 03' N	34° 46' E	KM72jb
14	Finland	OH2B	Lohja	60° 19' N	24° 50' E	KP20
15	Madeira	CS3B	Santo da Serra	32° 43' N	16° 48' W	IM12or
16	Argentina	LU4AA	Buenos Aires	34° 37' S	58° 21' W	GF05tj
17	Peru	OA4B	Lima	12° 04' S	76° 57' W	FH17mw
18	Venezuela	YV5B	Caracas	10° 25' N	66° 51' W	FK60nj



A little history to start with: On 2 November 1868, New Zealand officially adopted a standard time to be observed nationally, and was perhaps the first country to do so. It was based on longitude 172°30' East of Greenwich, 11½ hours ahead of Greenwich Mean Time (GMT).<sup>[1]</sup> This standard was known as **New Zealand Mean Time (NZMT)**.

making New Zealand 12 hours ahead of GMT. This change was made permanent from 1946 by the Standard Time Act 1945, at which the time at the 180°E meridian was made the basis for New Zealand Time. NZST remained half an hour ahead of NZMT, and the Chatham Islands 45 minutes ahead of NZST. In the late 1940s the atomic

new time scale known as Coordinated Universal Time (UTC) was adopted internationally in 1972. This was based on the readings of atomic clocks, updated periodically in accordance with time variations in the Earth's rotation by the addition or deletion of seconds (called leap seconds).

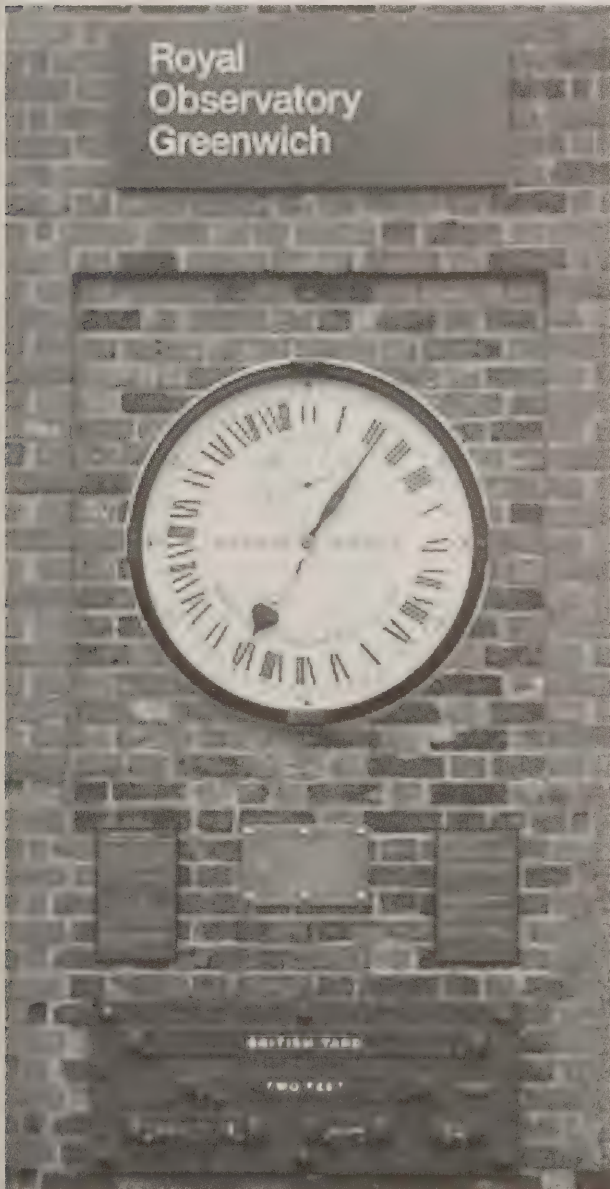
**The Time Act 1974** defines **New Zealand Standard Time (NZST)** as 12 hours in advance of UTC.

In 2011, Tokelau moved its time zone forward by 24 hours, by skipping 30 December.<sup>[2]</sup> This followed a similar decision by Samoa, as the only way to travel to Tokelau is by boat from Samoa. This has the result of putting Tokelau on the same date as New Zealand.

by about 200 clocks held by different national standards laboratories (including MSL), with the relativistic corrections applied. This is called international atomic time (TAI). However the problem is more complicated than this, because we would also like the time to be consistent with day and night and the rotation of the Earth. Since the Earth's rotation rate is gradually slowing down, occasional leap seconds have to be added to ensure that the sun crosses the Greenwich meridian within 0.9s of noon. This time is then called Coordinated Universal Time (UTC).

The advent of the Global Positioning System (GPS) with its satellites and orbiting atomic clocks has revolutionised time keeping. Now caesium clocks worldwide can be compared to each other and the global average maintained to within about 100ns over periods of months. The precision of atomic clocks may seem excessive, and for most applications that is true, however the rates of transmission of data on fibre-optic cables and high frequency communication systems are at present limited by the synchronicity of the clocks used to manage the data transfer. Fully automatic navigation and landing systems for aircraft have also only just become practical.

In the last couple of years handheld GPS receivers have become common, and in principle anyone who has a GPS receiver has direct access to UTC. However the accuracy of the time obtained in this way depends on a number of factors, including the type of receiver, and keeping track of the difference between GPS clocks and UTC. Measurement Standards Laboratory of New Zealand (MSL) is currently researching the performance of some of the low cost GPS systems, and developing ways of using them to transfer time to high accuracy.<sup>[6] [7]</sup>



Reference: [http://en.wikipedia.org/wiki/Greenwich\\_Mean\\_Time](http://en.wikipedia.org/wiki/Greenwich_Mean_Time)<sup>[3]</sup>

In 1941, during the Second World War, clocks were advanced half an hour,

clock was developed and several laboratories began atomic time scales. A

## Time, Duration

**second, s:** The second is the duration of 9 192 631 770 periods of the radiation corresponding to the transition between the two hyperfine levels of the ground state of the caesium 133 atom.

The practical realisation of the second is based on electrical oscillators that are locked to the frequency of the transition in caesium 133 atoms. One of the major limitations in atomic clocks has always been the influence of temperature, which causes the clocks to wander randomly. In the last few years techniques have been developed that enable caesium vapour to be cooled to very low temperatures, so now the best primary standards produce the second to about 1 part in 10<sup>16</sup>. In accordance with Einstein's theory of general relativity clocks run slower at low altitudes – on earth the effect is about 1 part in 10<sup>16</sup> per metre. Since everything else in the clock's immediate environment also runs slow, the relativistic effects are no problem for most laboratory experiments. However when one has to link clocks at different places on Earth there is a problem. So at present the time of day is based on the average time as maintained



## The National Measurement System New Zealand's standards and conformance infrastructure

The standards and conformance infrastructure consists of a number of autonomous organisations with specific and separate responsibilities which cooperate to ensure a coherent system. The National Measurement System is part of this infrastructure

MSL has primary responsibility for the provision of physical measurement standards. The calibration services are accredited to ISO/IEC 17025 by

International Accreditation New Zealand (IANZ).

The Measurement and Product Safety Service (MAPSS) is responsible for legal metrology and, unlike MSL, has enforcement powers under its legislation. MAPSS sources its measurement traceability from MSL and operates calibration laboratories accredited to ISO/IEC17025 by IANZ.

International Accreditation New Zealand (IANZ) is the national authority for the accreditation of testing and calibration laboratories. MSL has a memorandum of understanding with IANZ to advise on all matters related to measurement traceability. Standards New Zealand (SNZ) is the national standards body and also operates the Technical Barriers to Trade Enquiry Point on behalf of the Ministry of Foreign Affairs. The Joint Accreditation System of Australia and New Zealand (JAS-ANZ) provides accreditation for conformity assessment bodies in the fields of certification and inspection.

## Time and Frequency Standards Services

Standards of time and frequency are disseminated to New Zealand users by various means including time pips broadcast on Radio New Zealand, a talking clock service, and through monitoring TV line 6 signals.

## Time "PIPS"

The most widely used time signals are those broadcast by Radio New Zealand on the National Radio station. These are derived from the MSL caesium clocks and are transmitted every hour. They consist of six "pips" of 1000 Hz tone, at one second intervals, the beginning of each pip marking the exact second. When a pip marks the exact hour, its length is doubled. When a leap second is inserted seven pips are broadcast.

## Talking Clock

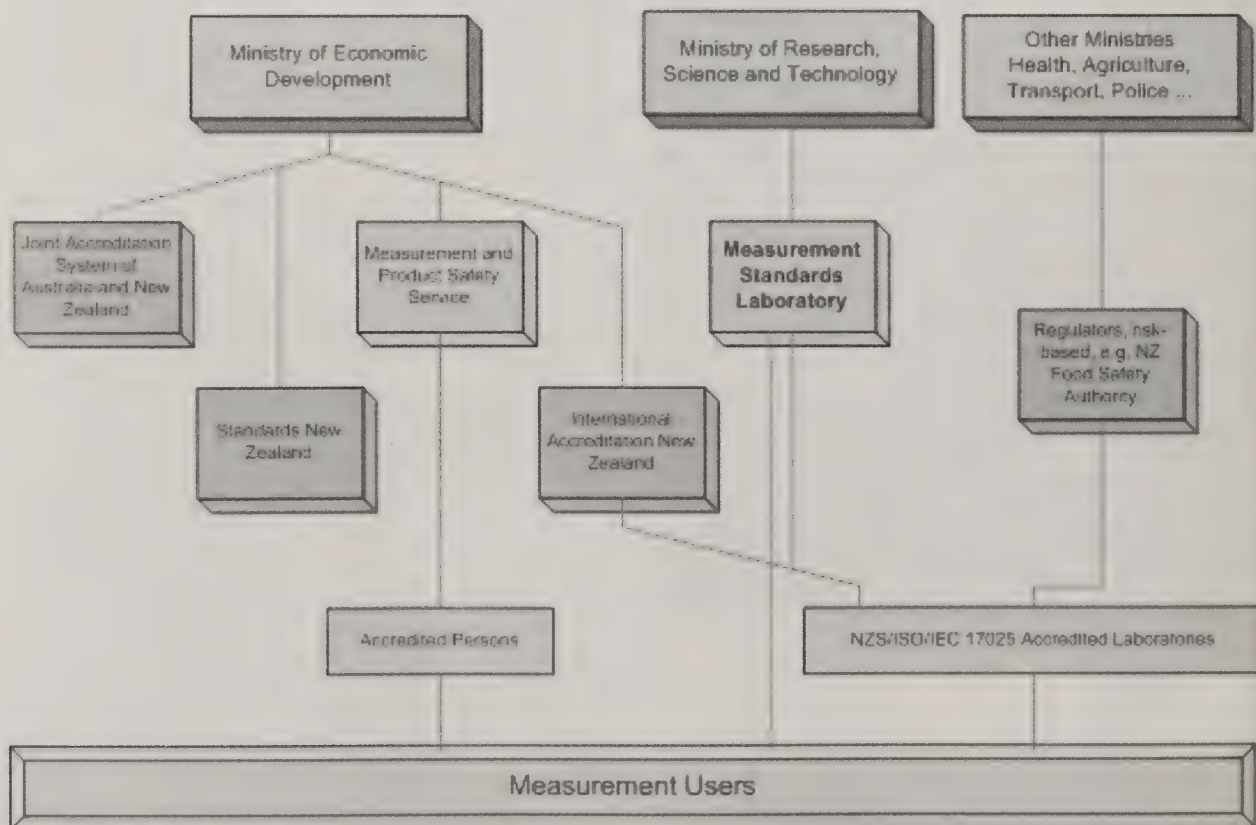
MSL operates a talking clock that is available to the New Zealand public via the Telecom NZ 0900 service. On dialing 0900 45-678, the user receives a voice announcement of the time followed by three "pips" of 1000 Hz tone. The start of the third pip is the exact time. The announcement and pips are repeated at 10 second intervals to give six time announcements in all, ensuring that the full minute is always included.

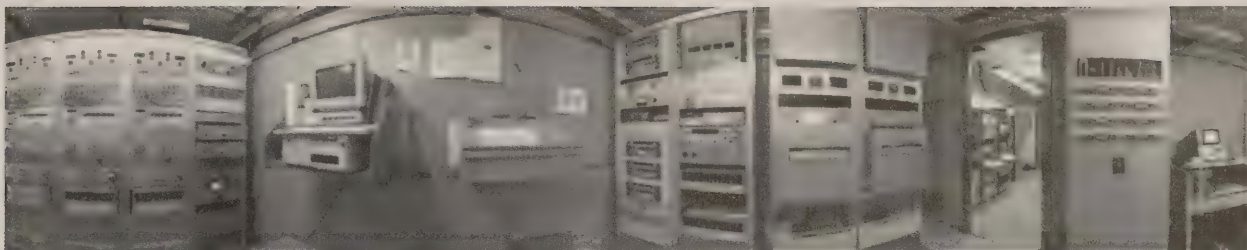
One of the aims of this service is to provide a means of disseminating the time standard to enable traceable calibration of stopwatches and other clocks. To perform such a calibration, it is necessary to document in a laboratory notebook, at least two

calls to the talking clock and note any changes in the two times. With a modern crystal controlled timepiece, there should not be any difference in the readings unless the time interval between the calls is several days.

## NTP Server

A Network Time Protocol (NTP) stratum 1 server is available for connections within New Zealand. NTP is a standard internet protocol for the synchronisation of computer time. NTP is designed mainly for synchronising high end servers. A simpler version (called Simple Network Time Protocol or SNTP) is a subset of NTP and is supported by the MSL server and can be used to set the time on





any computer. The server is <sup>[5]</sup> referenced to UTC (MSL) by direct connection of a pulse per second signal from the master caesium clock.

#### TV Line 6 Signals

The horizontal synchronisation pulses transmitted on the TV signals transmitted on the TV1 and TV2 channels are controlled by rubidium oscillators. We monitor the time of arrival of these pulses at MSL and publish a weekly and a monthly bulletin containing these readings. Owners of oscillators with a stability of greater than 1 part in 10<sup>9</sup> can also monitor the arrival time of the pulses at their location and then from the bulletins calculate the offset in frequency between their

local oscillator and the master clock at MSL.<sup>[8]</sup>

One of the most famous time and frequency sources is the radio station called "WWV". WWV operates in the high frequency (HF) portion of the radio spectrum. The station radiates 10,000 W on 5, 10, and 15 MHz; and 2500 W on 2.5 and 20 MHz. Each frequency is broadcast from a separate transmitter. Although each frequency carries the same information, multiple frequencies are used because the quality of HF reception depends on many factors such as location, time of year, time of day, the frequency being used, and atmospheric and ionospheric propagation conditions. The variety of frequencies makes it likely

that at least one frequency will be usable at all times. It is commonly used as a point of calibration for Software Defined Receivers or SDRs.

<sup>[9]</sup> <sup>[10]</sup> Courtesy of The National Institute of Standards and Technology (NIST) is an agency of the U.S. Department of Commerce. Several cesium atomic clocks provide the precise timing information broadcast by WWV.

#### Reference:

- <sup>[1]</sup><sup>[2]</sup> [http://en.wikipedia.org/wiki/Time\\_in\\_New\\_Zealand](http://en.wikipedia.org/wiki/Time_in_New_Zealand)
- <sup>[3]</sup> [http://en.wikipedia.org/wiki/Greenwich\\_Mean\\_Time](http://en.wikipedia.org/wiki/Greenwich_Mean_Time)
- <sup>[4]</sup> <http://msl.irl.cri.nz/>

<sup>[5]</sup> <http://msl.irl.cri.nz/services/time-and-frequency/ntp-server-information>

<sup>[6]</sup> <http://electronics.howstuffworks.com/gadgets/travel/gps.htm>

<sup>[7]</sup> <http://airandspace.si.edu/gps/work.html>

<sup>[8]</sup> <http://msl.irl.cri.nz/sites/all/files/training-manuals/TG09-July-2009.pdf>

<sup>[9]</sup> <http://www.nist.gov/pml/div688/grp40/www.cfm>

<sup>[10]</sup> [http://en.wikipedia.org/wiki/WWV\\_%28radio\\_station%29](http://en.wikipedia.org/wiki/WWV_%28radio_station%29)

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Question a gathering of hams, and one will inevitably find that several were once DXers or shortwave listeners before they moved on to join the ranks of amateur radio. Many listeners progress no further than just being listeners, a few becoming serious DXers, but for some the novelty of talking to the world draws them into amateur radio. Those who have progressed through the hobby of DXing have acquired much of the basic radio theory, and are better prepared for the study required for sitting the amateur radio exam.

The similarities between the two hobbies are numerous. The bands that DXers monitor range from VLF to VHF. The modes range from AM to FM. With the increasing use of computers, digital reception is gaining interest. However, despite the widening range of options, listening to shortwave broadcasts still remains the most popular activity.

Like amateur radio, the equipment used over the years has changed. Gone are the days when the dual band household radio served as the DX receiver. After the war, DXers used war-surplus radio sets such as the Marconi R1155, ARC5 and Bendix MN26C compass receiver. Gradually, valve communication receivers, such as the Eddystone and Hallicrafters became available and affordable. Today, like the amateur, we are in the digital age, with sophisticated receivers ranging from the small portable SONY 7600G to the ICOM R7x series and the professional NRD545 communications receivers and latterly a variety of Software Defined Radios (SDR) or PC Controlled Radios

(PCR). There has been an increase in the number of small sized, lower priced analogue and digital portable receivers being manufactured under a variety of names so there should be something to suit all budgets. Over the years amateur equipment has developed to an even greater extent, with many hams using multi-functional transceivers which incorporate all-band general coverage reception.

Unlike the amateurs, the antennas used by the DXer over the years have changed little. The fortunate few who have the space to run out a Beverage still chase the elusive medium wave DX. Most persevere with an end-fed wire or a dipole. Those DXers living in high noise suburbia may try and develop low-noise antennas like the EWE or Flag types. Like amateur radio there is great scope for development, but we do tend to lack the technical expertise that the ham fraternity can draw upon. Because of the wide range of shortwave bands, the DXer does have great difficulty designing a multi-band antenna. However, with regard to propagation, I feel that any top DXer can "hold their own" with a ham DXer. Propagation is just as important to both hobbies. We complain about band conditions just as much as the ham down the road.

For many shortwave listeners, the QSLing of reception reports is the whole purpose of it all. But more and more, verification is becoming less important and just hearing the station and programme is the enjoyment. The variety of programmes heard over international broadcasters is far more varied and interesting than that heard on domestic



*NZ Radio DX League member Gordon Baker of Tauranga, DXer and collector of communications receivers, with a venerable Eddystone 680X receiver on his radio shack workbench. (2005)*

radio. Nevertheless, serious DXing is still the backbone of the hobby, and the thrill of hearing and finally verifying a rare low powered station from some exotic country, is no different than that experienced by an amateur DXer.

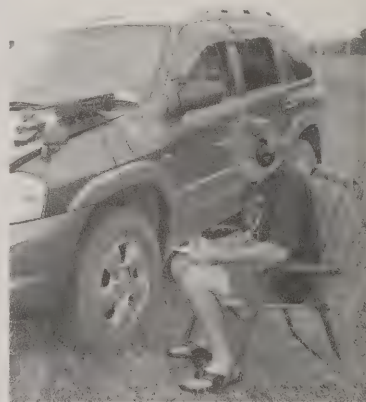
DXing in New Zealand is almost as old as amateur radio, with the first DX club being formed in 1931. Although the New Zealand DX Club folded in the late 1940s, two other DX clubs are still active; the New Zealand DX Radio Association, now over 70 years old, and the New Zealand Radio DX League, which celebrated its 60th anniversary in 2008.

Amateur radio, like other hobbies, loses many participants to other pastimes and interests. This loss of interest in some cases may be due to boredom or burnout with the hobby. New horizons and challenges may be needed. We all get stale or frustrated at some time. May it be suggested to those amateurs who feel they need a variation or change, but still retain their interest in wireless, is that they consider shortwave listening? Some hams that entered amateur radio through the hobby of DXing might consider revisiting it. Most hams have an antenna and a rig capable of general coverage reception. It might be worthwhile tuning a bit further than just the ham bands. Start listening to the world of International Shortwave Broadcasting. Both hobbies fit nicely together, as found in Auckland where the Western Suburbs Radio Club allows the Auckland Branch of the New

Zealand Radio DX League to hold its monthly meetings in their clubrooms. In return, Branch 03 has gained several newly licensed hams from the ranks of the DXers. Try listening to a few broadcasts or download a sample of the New Zealand Radio DX League's monthly magazine, the NZ DX TIMES from the New Zealand Radio DX League's own Internet site at <[www.radiodx.com](http://www.radiodx.com)>, which is a great starting point for anyone interested in shortwave listening. Information on how to join the NZ Radio DX League and membership options can be found here. I have found that shortwave listening and amateur radio complement each other and have helped maintain my interest in both hobbies for many years.



*Peter Grenfell of Oamaru, Life Member of the NZ Radio DX League, DXing with an Icom communications receiver at the League's famous Tiwai (Southland) Listening Post (2003). Other receivers shown - Drake SPR4 and Grundig Satellit.*



*Bryan Clark, Vice President of the NZ Radio DX League, chasing rare DX whilst mobile with an AOR7030+ communications receiver and ground Beverage antenna (BOG) at Mangawhai Northland (2003)*

# NEW ZEALAND COASTAL MARITIME RADIO STATIONS

## Maritime Radio Service

For seafarers, their vessel's radio is their main lifeline to land. Maritime New Zealand's Maritime Radio Service (Maritime Radio) is responsible for maintaining VHF and HF radio services for New Zealand's coastal waters and much of the South Pacific Ocean and Tasman Sea. The services it provides include monitoring radio frequencies for distress messages around the clock. The region covered by the New Zealand Distress and Radio Safety Service is known

as NAVAREA XIV and includes 12.5 percent of the Earth's ocean surface. It extends from the middle of the Tasman Sea to the mid-Pacific Ocean, and from Antarctica to the equator. Maritime New Zealand (MNZ) is also responsible for broadcasting Maritime Safety Information (MSI) within the NAVAREA. MSI includes meteorological information, coastal and oceanic navigational warnings, ice accretion warnings and ionospheric prediction forecasts. The service provided by MNZ

is complemented by a network of volunteer private radio operators located around New Zealand and its offshore islands. The network is monitored at all times by staff working at the Maritime Operations Centre (MOC), co-located with the Rescue Coordination Centre New Zealand in Lower Hutt. The Maritime Radio Service comprises 30 coastal VHF stations. Of these stations, 28 provide VHF radio coverage throughout the coastal waters of New Zealand. The other two

stations provide VHF radio coverage in the coastal waters of the Chatham Islands. There is also an oceanic MF/HF radio station located east of Lake Taupo. All stations are linked to the MOC. It coordinates the transmission of all MSI on voice HF and VHF, as well as navigational warnings broadcast over the Inmarsat SafetyNET satellite system. The scheduled broadcast times, channels and frequencies are detailed below.

# TABLES OF SSB FREQUENCIES & VHF CHANNELS

All vessels licensed to operate in the marine frequency bands between 1605kHz and 2850kHz must be able to transmit and receive on 2182kHz. Distress, urgency and safety calls should be made on this frequency. The 2182kHz frequency is also the general calling (hailing) and reply frequency when establishing communication with vessels and coastal stations, and is used by coastal stations to announce the transmission of safety information and lists of current messages. Except for distress and urgency, all communications should be carried out on a working or inter-ship frequency, leaving 2182kHz available for such calls. Safety traffic should also be transmitted on a working frequency.

New Zealand SSB frequencies in medium and high-frequency bands (MF/HF)	
Supplementary calling frequency	2045kHz
Supplementary ship-to-ship frequency	2068kHz
Inter-ship working frequency (for use after communication has been established on 2182kHz or 2045kHz)	2456kHz 2638kHz 2068kHz
Harbour authority working frequency	2162kHz 2012kHz
Working frequencies for exchanging messages between private coastal stations and ships (after communication has been established on 2182kHz or 2045kHz)	2480kHz 2444kHz
For communication with coastal stations providing communication for aquatic sporting events (also used by land stations providing communication for sporting events)	2089kHz 2129kHz
Working frequencies between coastal and ship stations, or inter-ship (after initial contact has been established on 4125kHz)	4146kHz 4417kHz
Working frequencies between coastal and ship stations, or inter-ship (after initial contact has been established on 6215kHz)	6224kHz 6227kHz
Working frequencies for exchanging messages between Taupo Maritime Radio and ships (after communication has been established on a calling frequency)	2207kHz 4146kHz 6224kHz 8297kHz 12356kHz 16531kHz

International distress and calling frequencies in medium and high-frequency bands (MF/HF)	
The international distress, safety and calling frequency for radio-telephony <b>ALWAYS KEEP A LISTENING WATCH ON THIS CHANNEL</b>	2182kHz
The international distress, safety and calling frequency	4125kHz 6215kHz
International calling frequency only (not monitored by Maritime Operations Centre (MOC)/callsign ZLM)	8255kHz
International distress and safety frequency only	8291kHz

International distress, safety and calling frequencies	12290kHz 16420kHz
VHF channels used in New Zealand	
The international distress, safety and calling frequency for the marine mobile VHF radio-telephone service. All vessels' stations licensed to operate in the authorised bands between 156MHz and 174MHz must be able to transmit and receive on this channel. <b>ALWAYS KEEP A LISTENING WATCH ON THIS CHANNEL</b>	16
Inter-ship navigation safety	13
Working channels for inter-ship communication	6, 8
Working channels for harbour authority radio communications on port operation and vessel movements	9, 10, 11, 12, 14, 19
Continuous weather transmission channels	20, 21, 22, 23
Two-frequency talk-through repeater channels (some allocated to Coastguard and other private coastal stations)	1, 2, 3, 4, 5, 60, 61, 62, 63, 64, 65, 66, 80, 81, 82, 83, 84, 85, 86
Working channel for Great Barrier Maritime Radio	25
Working channel for Whangarei, Tolaga, Wairarapa, Taranaki, D'Urville, Fox, Puysegur, Kaikoura and Waitaki maritime radio and anti-pollution operations	67
Working channel for Cape Reinga, Plenty, Napier, Farewell, Picton, Akaroa, Greymouth and Bluff maritime radio	68
Working channel for Whanganui maritime radio	69
DSC (Digital Selective Calling) distress alert and messaging. There is currently no shore-based VHF DSC in New Zealand.	70
Working channels between coastal and ship stations (after initial contact has been made on channel 16) and for Kaitaia, Auckland, Runaway, Wellington, Westport, Fiordland, Chalmers, Cape Egmont and Stewart Island maritime radio	71
Channel for use in association with marina developments	73
Working channels between coastal and vessel stations (after initial contact has been made on channel 16)	74
Channels available for aquatic events	17, 77
Working channels for Chatham Islands maritime radio	60, 62



VHF broadcasts

Maritime Radio makes the following broadcasts each day. These include weather warnings, situation and forecast, and navigational warnings. All times are in New Zealand Local Time and include a long-range (five-day) outlook. All New Zealand coastal VHF stations broadcast forecasts for all weather areas simultaneously .

Maritime Radio VHF voice broadcasts	
Calling	Channel 16
Working	Channels 25, 67, 68, 69, 71 (refer to map for area detail)
Times	0133, 0533, 0733, 1033, 1333, 1733, 2133 NZST or NZDT

**Note:** the 1033 broadcast includes all warnings in force and reports from coastal stations, but provides no situation or forecast.

Local area forecasts and current wind conditions are also broadcast continuously by Coastguard using channels 20–23. Chatham Islands coastal VHF stations transmit weather forecasts simultaneously on their working channels 60 and 62 at 0603, 1403, 1803, 2203 (Chatham Islands Local Time).

Taupo Maritime Radio/ZLM (MF/HF)

The MF/HF (SSB) Maritime Radio Service is provided by Taupo Maritime Radio, whose antennae are on a site in the central North Island. A continuous watch is kept on all calling frequencies.

The calling and working frequencies are shown below.

Taupo Maritime Radio voice frequencies (kHz)	
Calling	2182 4125 6215 8291 12290 16420
Working	2207 4146 6224 8297 12356 16531

For vessels near New Zealand, the lower frequency bands (in MHz) generally provide the best radio communication with Taupo Maritime Radio.

Taupo Maritime Radio Digital Selective Calling (DSC) frequencies (kHz)					
Distress	4207.5	6312.0	8414.5	12557.0	16804.5

MF/HF propagation can never be exactly predicted for all places, times and conditions. For guidance on the best frequencies to use, mariners are advised to keep a close watch on the Ionospheric Prediction Service (IPS) warnings in Notices to Mariners.

MF/HF broadcasts

The following broadcasts are made on MF/HF frequencies from Taupo Maritime Radio. A preliminary call is made on the calling frequencies, with broadcasts then made on the working frequencies. All times are in New Zealand Local Time.

Broadcast Type	Times	Frequencies	
Coastal warnings and bulletins (including Chatham Islands)	0133	2182	2207
	1333	4125	4146
	0533	6215	6224
	1733		
Coastal reports	0803	2182	2207
	1203	4125	4146
	2003	6215	6224
Oceanic warnings*	0303	6215	6224
	0333	8291	8297
	1503	12290	12356
	1533	16420	16531
Oceanic weather bulletins and warnings	0903	6215	
	1003	6215	6224
	2103	8291	8297
	2203	12290	12356
		16420	16531

\* For daylight saving time, add one hour.

Notes:

- Bulletins contain the weather situation and forecast.
- Reports contain the weather situation at selected coastal sites.
- Warnings include navigational, ionospheric and meteorological warnings.

Useful contacts

Maritime New Zealand (MNZ)

PO Box 27006  
Wellington 6141  
Ph (04) 473 0111  
Fax (04) 494 1263  
Email maritime.radio@maritimenz.govt.nz

Contact details for district offices are listed on the website

www.maritimenz.govt.nz

Rescue Coordination Centre New Zealand (RCCNZ)

PO Box 30050  
Lower Hutt 5040  
Ph (04) 577 8030  
Fax (04) 577 8038  
Email rccnz@maritimenz.govt.nz

24-hour numbers:

Freephone 0508 472 269  
(not available to satellite telephone users)

Accident reporting

Freephone 0508 222 433

Marine Pollution

Response Service (MPRS)

PO Box 45209  
Auckland 0651  
Ph (09) 834 3908  
Fax (09) 834 3907  
Email mprs@maritimenz.govt.nz  
**Maritime Operations Centre (MOC)**  
Ph 0800 MARITIME (0800 627 484) or (04) 914 8333  
Fax (04) 914 8334  
Email maritime@kordia.co.nz



Channel	Tx Frequency MHz	Rx Frequency MHz
1	156.050	160.650
2	156.100	160.700
3	156.150	160.750
4	156.200	160.800
5	156.250	160.850
6	156.300	156.300
7	156.350	156.950
8	156.400	156.400
9	156.450	156.450
10	156.500	156.500
11	156.550	156.550
12	156.600	156.600
13	156.650	156.650
14	156.700	156.700
15	156.750	156.750
16	156.800	156.800
17	156.850	156.850
18	156.900	161.500
19	156.950	161.550
20	157.000	161.600
21	157.050	161.650
22	157.100	161.700
23	157.150	161.750
24	157.200	161.800
25	157.250	161.850
26	157.300	161.900
27	157.350	161.950
28	157.400	162.000
60	156.025	160.625

61	156.075	160.675
62	156.125	160.725
63	156.175	160.775
64	156.225	160.825
65	156.275	160.875
66	156.325	160.925
67	156.375	160.975
68	156.425	156.425
69	156.475	156.475
70	-	156.525
71	156.575	156.575
72	156.625	156.625
73	156.675	156.675
74	156.725	156.725
75	156.775	156.775
76	156.825	156.825
77	156.875	156.875
78	156.925	161.525
79	156.975	161.575
80	157.025	161.625
81	157.075	161.675
82	157.125	161.725
83	157.175	161.775
84	157.225	161.825
85	157.275	161.875
86	157.325	161.925
87	157.375	161.975
88	157.425	162.025
87B (AIS-1)	161.975	161.975
88B (AIS-1)	162.025	162.025

All vessels licensed to operate in the marine frequency bands between 1605kHz and 2850kHz must be able to transmit and receive on 2182kHz. Distress, urgency and safety calls should be made on this frequency. The 2182kHz frequency is also the general calling (hailing) and reply frequency when establishing communication with vessels and coastal stations, and is used by coastal stations to announce the transmission of safety information and lists of current messages. Except for distress and urgency, all communications should be carried out on a working or inter-ship frequency, leaving 2182kHz available for such calls. Safety traffic should also be transmitted on a working frequency.

## MARITIME RADIO VHF COVERAGE



**Note:** This map represents approximate location and coverage of Maritime New Zealand's VHF radio stations. From time to time gaps may exist within the areas shown due to terrain shadows and system maintenance. Terrain shadows can occur close to the shore under cliffs or in bays and fiords.

- 24hr/day listening watch is kept by all VHF stations on channel 16.
- The coverage shown above is for vessels with a 25W radio working into a correctly installed antenna mounted 4m or more above the waterline.



# NEW ZEALAND RADIO SPECTRUM USAGE

Information Courtesy of Ministry of Economic Development (MED) Radio Spectrum Management Group (RSM)  
Refer to <http://www.rsm.govt.nz/cms/tools-and-services/publications/public-information-brochures-pibs/pib-21-table-of-radio-spectrum-usage-in-new-zealand> for more information

Frequency Range	New Zealand Allocation	Summary of Usage
Below 9 kHz	Not allocated	Research of VLF propagation
9-90 kHz	Fixed Mobile (irr-4.4)	Leaky coaxial cable for, communications underground, e.g. Mining, 9-190 kHz, SRD usage restricted to, Determination, Telemetry and, Telecommand
90-190 kHz	Amateur (irr-4.4) Mobile (irr-4.4)	9-190 kHz, SRD usage restricted to, Determination, Telemetry and, Telecommand, Usage includes: Car locks, alarms and, immobilizers, Shop tag identification systems 130 – 190 kHz amateur usage
190-405 kHz	Aeronautical Radionavigation	Aeronautical NDBs
405-415 kHz	Radionavigation	
415-495 kHz	Maritime mobile	415 – 521 kHz Government, Maritime Mobile Services, 457 kHz Avalanche beacons
495-505 kHz		
505-526.5 kHz	521-1612 Khz Broadcasting	521-1612 kHz, MF-AM Sound Broadcasting, under MR regime, 525-1705 kHz under, Ministerial Directive
526.5-535 kHz	521-1612 Khz Broadcasting (Continued)	521-1612 kHz, MF-AM Sound Broadcasting, under MR regime
535-1 606.5 kHz		525-1705 kHz under, Ministerial Directive
1 606.5-1 800 kHz	1612-1690 Khz Radionavigation 1690-1800 Khz Fixed mobile	Aeronautical NDBs, 525-1705 kHz under, Ministerial Directive, CT1 Cordless Telephone base, transmitters, Generally licensed Radio, Buoys, Government Land & Maritime, Mobile Services, 525-1705 kHz under, Ministerial Directive
1 800-2 000 kHz	1800-1950 Khz amateur Fixed mobile except aeronautical mobile 1950-2000 Khz Mobile except aeronautical Mobile Radionavigation Radiolocation	Amateur 160m band, Maritime Radio Buoys, Government Maritime Mobile, Services
2 000-2 065 kHz	Fixed mobile	Maritime Mobile, Land Mobile
2 065-2 107 kHz	Maritime mobile	Maritime Mobile
2 107-2 170 kHz	Mobile	Maritime Mobile - coast, stations, Land Mobile Government, Services
2 170-2 173.5 kHz	Maritime mobile	Guard band for 2182 kHz
2 173.5-2 190.5 kHz	Mobile	2182 kHz distress, safety and, calling
2 190.5-2 194 kHz	Maritime mobile	Guard band for 2182 kHz
2 194-2 300 kHz	Fixed mobile	Predominantly Mobile with, some Fixed usage
2 300-2 495 kHz	Fixed mobile	Land and Maritime Mobile
2 495-2 501 kHz	Standard frequency 2.5 Mhz	
2 501-2 502 kHz		
2 502-2 505 kHz		
2 505-2 850 kHz	Mobile	Land, maritime and, aeronautical mobile
2 850-3 025 kHz	Aeronautical mobile (r)	Aeronautical Base and SAR, (3023 kHz)
3 025-3 155 kHz	Aeronautical mobile (Or)	Commercial and Government, aeronautical services
3 155-3 200 kHz	Mobile except aeronautical Mobile (r)	Land Mobile simplex and, Aeronautical Mobile (OR), 3180 – 3380 kHz SRD usage
3 200-3 230 kHz	Fixed mobile except aeronautical mobile (r)	Predominantly Land Mobile, with a few Fixed assignments, 3180 – 3380 kHz SRD usage
3 230-3 400 kHz		
3 400-3 500 kHz	Aeronautical mobile (r)	Aeronautical base transmitters, at Auckland Airport
3 500-3 900 kHz	Amateur mobile	80m Amateur Band, 3640 – 4040 kHz SRD usage
3 900-3 950 kHz	Aeronautical mobile Broadcasting	Government Land and, Aeronautical Mobile services, 3640 – 4040 kHz SRD usage
3 950-4 000 kHz	Fixed	Government Fixed and, Aeronautical Mobile services, 3640 – 4040 kHz SRD usage
4 000-4 063 kHz	Fixed Maritime mobile	Government Fixed Services, 3640 – 4040 kHz SRD usage
4 063-4 438 kHz	Maritime mobile	Maritime mobile and coast, stations, 4125 kHz distress, safety and, calling
4 438-4 650 kHz	Fixed mobile	Heavily used for Fixed and, Mobile services, Range of 'All New Zealand', Fixed Services. Fixed service, to South Pacific and sub-, Antarctic islands. Extensive, land mobile service to remote, locations.
4 650-4 700 kHz	Aeronautical mobile (r)	Aeronautical base stations
4 700-4 750 kHz	Aeronautical mobile (Or)	Government Aeronautical, Mobile services.
4 750-4 850 kHz	Fixed land mobile	Government Services
4 850-4 995 kHz	Land mobile	Land Mobile Simplex Services
4 995-5 003 kHz	Standard frequency 5 Mhz	
5 003-5 005 kHz	Standard frequency 5 Mhz	
5 005-5 060 kHz	Fixed	Government Fixed Service
5 060-5 250 kHz	Fixed Land mobile	Government Fixed and Land Mobile services

5 250-5 450 kHz	Fixed Land mobile	Fixed and Land Mobile, services, Extensive Government and, Civil Defence use
5 450-5 480 kHz	Aeronautical mobile (Or) Land mobile	Aeronautical and Land Mobile, services
5 480-5 680 kHz	Aeronautical mobile (r)	Flight operations based in, Auckland, Christchurch,, Invercargill, Queenstown and, Milford
5 680-5 730 kHz	Aeronautical mobile (Or)	Aeronautical Mobile and SAR, (5680 kHz)
5 730-5 900 kHz	Mobile except aeronautical Mobile (r)	Government Fixed and Land, Mobile services
5 900-5 950 kHz	Broadcasting Fixed	HF Sound Broadcasting and, Government Fixed services
5 950-6 200 kHz	Broadcasting	HF sound broadcasting to the, Pacific Islands
6 200-6 525 kHz	Maritime mobile	Maritime mobile and coast, stations, 6215 kHz distress, safety and, calling
6 525-6 685 kHz	Aeronautical mobile (r)	Flight operations based in, Auckland
6 685-6 765 kHz	Aeronautical mobile (Or)	Government Aeronautical, Mobile services
6 765-7 000 kHz	Fixed mobile	6765-6795 kHz, ISM and SRD Determination,, Telemetry and Telecommand, usage, Government Fixed and Land, Mobile services, 6911.4 kHz SAR.
7 000-7 100 kHz	Amateur Amateur-satellite	Amateur 40m Band
7 100-7 200 kHz	Amateur	Amateur
7 200 7300	Broadcasting amateur	HF Sound Broadcasting
7 300-7 400 kHz	Fixed land mobile	Government Fixed Services
7 400 7450 kHz		HF Sound Broadcasting, Land Mobile and Government, Fixed Services
7 450-8 100 kHz	Fixed land mobile	Government Fixed and Land, Mobile services for both, national and international, coverage within the South, Pacific and sub-Antarctic, Islands.
8 100-8 195 kHz	Fixed Maritime mobile	Maritime Mobile services
8 195-8 815 kHz	Maritime mobile	Maritime mobile and coast, stations, 8291 kHz distress, safety and, calling
8 815-8 965 kHz	Aeronautical mobile (r)	Flight operations based in, Auckland
8 965-9 040 kHz	Aeronautical mobile (Or)	Government Aeronautical, services, Flight operations based in, Auckland
9 040-9 400 kHz	Fixed	Government Fixed and Land, Mobile services for national, and international coverage, within the South Pacific and, sub-Antarctic Islands.
9 400-9 500 kHz	Broadcasting fixed	HF Sound Broadcasting, Government Fixed services
9 500-9 900 kHz		HF Sound Broadcasting
9 900-9 995 kHz	Fixed	Government Fixed and Land, Mobile services for both, national and international, coverage within the South, Pacific and sub-Antarctic, Islands
9 995-10 003 kHz	Standard frequency 10 Mhz	
10. 003-10. 005 MHz		
10.005-10.100 MHz	Aeronautical mobile (r)	Flight operations based in, Auckland
10.100-10.150 MHz	Amateur	Amateur 30m Band
10.150-11.175 MHz	Fixed	Government Fixed services for, both national and international, coverage, 10.44 – 10.76 MHz SRD, usage
11.175-11.275 MHz	Aeronautical mobile (Or)	Government Aeronautical, services
11.275-11.400 MHz	Aeronautical mobile (r)	Flight operations based in, Auckland
11.400-11.600 MHz	Fixed	Government Fixed services
11.600-11.650 MHz	Fixed	
11.650-12.050 MHz	Broadcasting	HF Sound Broadcasting
12.050-12.100 MHz	Fixed	Government Fixed services
12.100-12.230 MHz	Fixed	
12.230-13.200 MHz	Maritime mobile	Maritime mobile and coast, stations, 12.290 MHz distress, safety, and calling
13.200-13.260 MHz	Aeronautical mobile (Or)	Government Aeronautical, services
13.260-13.360 MHz	Aeronautical mobile (r)	Flight operations based in, Auckland
13.360-13.410 MHz	Fixed	Government Fixed services
13.410-13.570 MHz	Fixed Mobile	Government Fixed and Land, Mobile services, 13.550-13.570 MHz, ISM & SRD Telemetry and, Telecommand usage
13.570-13.600 MHz	Broadcasting	HF Sound Broadcasting
13.600-13.800 MHz		
13.800-13.870 MHz		
13.870-14.000 MHz	Fixed	Fixed and Land Mobile, services
14.000-14.250 MHz	Amateur Amateur-satellite	Amateur 20m Band
14.250-14.350 MHz	Amateur	
14.350-14.990 MHz	Fixed	Government Fixed services
14.990-15.005 MHz	Standard frequency 15 Mhz	
15.005-15.010 MHz		
15.010-15.100 MHz	Aeronautical mobile (Or)	Government Aeronautical, services
15.100-15.600 MHz	Broadcasting	HF Sound Broadcasting
15.600-15.800 MHz	Fixed	Government Fixed services, HF Sound Broadcasting
15.800-16.360 MHz	Fixed	Government Aeronautical and, Fixed services
16.360-17.410 MHz	Maritime mobile	Maritime mobile and coast, stations, 16.420 MHz distress, safety, and calling
17.410-17.480 MHz	Fixed	Government Fixed services



17.480-17.550 MHz	Fixed	
17.550-17.900 MHz	Broadcasting fixed	Government Fixed services, HF Sound Broadcasting
17.900-17.970 MHz	Aeronautical mobile (r)	Flight operations based in, Auckland
17.970-18.030 MHz	Aeronautical mobile (Or)	Government Aeronautical, services
18.030-18.052 MHz	Fixed	Government Fixed services
18.052-18.068 MHz	Fixed	
18.068-18.168 MHz	Amateur	Amateur 17m Band
18.168-18.780 MHz	Fixed	Government Fixed and Land, Mobile services
18.780-18.900 MHz	Maritime mobile	Maritime mobile ship station
18.900-19.020 MHz	Broadcasting	
19.020-19.680 MHz	Fixed	Government Fixed services
19.680-19.800 MHz	Maritime mobile	Maritime mobile coast station
19.800-19.990 MHz	Fixed	Government Fixed services
19.990-19.995 MHz	Standard frequency 20 Mhz	
19.995-20.010 MHz	Standard frequency 20 Mhz	
20.010-21.000 MHz	Fixed	Government Fixed and Land, Mobile services
21.000-21.450 MHz	Amateur	Amateur 15m Band
21.450-21.850 MHz	Broadcasting fixed 4.4	Government Fixed services,
21.850-21.870 MHz	Fixed	
21.870-21.924 MHz	Fixed	
21.924-22.000 MHz	Aeronautical mobile (r)	Flight operations based in, Auckland
22.000-22.855 MHz	Maritime mobile	Maritime mobile and coast, stations
22.855-23.000 MHz	Fixed	Government Fixed services
23.000-23.200 MHz		
23.200-23.350 MHz	Aeronautical mobile (Or)	Government Aeronautical, services
23.350-24.000 MHz	Fixed	Government Fixed services
24.000-24.890 MHz	Fixed land mobile	Government Fixed and Land, Mobile Services
24.890-24.990 MHz	Amateur Amateur-satellite	Amateur 12m band
24.990-25.005 MHz	Standard frequency 25 Mhz	
25.005-25.010 MHz		
25.010-25.070 MHz	Fixed mobile	Government Fixed services
25.070-25.210 MHz	Maritime mobile	Government Maritime services
25.210-25.550 MHz	Fixed mobile	Government Fixed and Land, Mobile services
25.550-25.670 MHz	Fixed 4.4	Government Fixed services
25.670-26.100 MHz	Broadcasting	
26.100-26.175 MHz	Maritime mobile	
26.175-27.500 MHz	Fixed mobile except aeronautical mobile Fixed mobile except aeronautical mobile	Government Fixed Services, 26.175 - 26.3 MHz, Meteorological (auroral radar), at Birdlings Flat, 26.325 – 27.41 MHz, Citizen Band "CB" radio, service, 26.95 - 27.3 MHz, Local area paging services, ISM usage, SRD unrestricted usage, Aeronautical model control, Amateur
27.500-28.000 MHz	Fixed mobile	Government Fixed and Land, Mobile services
28.000-29.700 MHz	Amateur Amateur-satellite	Amateur 10m Band
29.700-30.005 MHz	Fixed mobile	29.7 - 30.0 MHz SRD, unrestricted usage, Aeronautical model control, Government Fixed and Land, Mobile services, 29.8 - 30.00 MHz Telemetry, and telecommand
30.005-30.01 MHz	Unallocated	
30.01-37.5 MHz	Fixed mobile	30.4 - 37.5 MHz Government, Fixed and Land Mobile, services, 30.05 - 30.8 MHz Cordless, Telephone "CT1 Band" base, transmit, 30.8 – 31.5 MHz SRD usage, 31.3 - 31.6 Radio Paging, usage, 31.5 – 32 MHz Aeronautical, model control SRDs, 33.40 MHz TV Sound IF, 35 – 37 MHz Aeronautical, model control SRDs, 35.5-37.2 MHz SRD, unrestricted usage
37.5-38.25 MHz	Fixed mobile	Government Fixed and Land, Mobile services
38.25-39.986 MHz		Government Fixed and Land, Mobile services, 38.90 MHz TV Vision IF, 39 - 39.7 MHz Aeronautical, model control SRDs, 39.7 - 40.5 MHz Cordless, Telephone "CT1 Band" Mobile Transmit
39.986-40.02 MHz	Fixed mobile	
40.020-40.980 MHz		Government Fixed and Land, Mobile services, 40.5 – 40.66 MHz, Aeronautical model control, SRDs, 40.66 – 40.7 MHz SRD usage, Telemetry and Telecommand, 40.7 – 41 MHz Aeronautical, model control SRDs, 40.8 – 41 MHz SRD usage
40.98 – 41.015		Auroral Radar at Birdlings Flat
41.015-44 MHz		
44-47 MHz	Broadcasting	44-51 MHz, VHF television broadcasting, under MR regime (MR47), Radio Spectrum Auctions
47-50 MHz	Broadcasting	44-51 MHz, VHF television broadcasting, under MR regime (MR47), Radio Spectrum Auctions
50-54 MHz	50 - 51 Mhz fixed mobile Broadcasting amateur 51 - 54 Mhz fixed mobile Amateur	Government Fixed and Land, Mobile services, Amateur 6m Band
54-68 MHz	Fixed mobile broadcasting	VHF television broadcasting, under MR regime (MR48),

68-74.8 MHz	Fixed mobile	Government and Commercial, Fixed and Land Mobile, Services, 72 – 72.5 MHz SRD usage, 72 - 72.8 MHz Aeronautical, Model Control, 72.8 - 73 MHz Cordless, Telephone “CT1 Band” Mobile, Transmit
74.8-75.2 MHz	Aeronautical Radionavigation	
75.2-75.4 MHz	Mobile	75.2 - 77.1 MHz Land Mobile, “ESA” Band Base Transmit
75.4-87 MHz	Mobile	, 76.1 – 78.1 MHz Land Mobile, “ESA” Band Simplex, 78.1 - 80 MHz, Land Mobile “ESA” Band, Mobile Transmit, 81 – 87.475 MHz Land Mobile, “A” Band
87-100 MHz	Fixed mobile Broadcasting	81 – 87.475 MHz Land Mobile, “A” Band, 87.5 - 88.4 MHz Low power, FM sound broadcasting, 87.5 - 108 MHz SRD usage, 88 - 108 MHz under, Ministerial Directive, 88.4 – 106.63 MHz FM Sound, broadcasting band, Under MR regime (MR207)
100-108 MHz	Broadcasting	88.4 - 106.63 MHz FM sound, broadcasting band, Under MR regime (MR207), 106.63 - 108 MHz low power, FM sound broadcasting, 87.5 - 108 MHz SRD usage, 88-108 MHz under Ministerial, Directive
108-117.975 MHz	Aeronautical Radionavigation	108 - 112 MHz ILS Localisers, at some airports, 112 - 117.975 MHz VOR, Aeronautical Beacons
117.975-137 MHz	Aeronautical mobile (r)	117.975 - 130 MHz, widespread aeronautical use, 121.5 MHz Search and, Rescue, 123.1 MHz Low power search, and rescue transceivers, 132 - 132.6 MHz aeronautical, repeaters base transmit, 135.4 - 136 MHz aeronautical, repeaters base receive, 136 - 137 MHz Aeronautical, data use
137-137.025 MHz	Mobile-satellite (space-to-earth)	137-138 MHz, Government service usage
137.025-137.175 MHz	meteorological-Satellite (space-to-earth)	
137.175-137.825 MHz	Fixed mobile	
137.825-138 MHz		
138-143.6 MHz	Mobile	138-144 MHz Land mobile, “ESB Band”
143.6-143.65 MHz		
143.65-144 MHz		
144-146 MHz	Amateur Amateur satellite	144-148 MHz Amateur 2m, Band
146-148 MHz	Amateur	Limited Government service, usage
148.000-149.900 MHz	Mobile Mobile-satellite (earth-to-space)	Mobile Satellite Services, Civil Defence and Emergency, service use throughout New, Zealand
149.900-150.050 MHz	Radionavigation-satellite	
150.050-156.4875 MHz	Mobile-satellite (earth-to-space)	
150.050-156.4875 MHz	Mobile	150.05-156 MHz, Land Mobile “E” Band
156.4875-156.5625 MHz	Maritime mobile	156-157.6 MHz Maritime, Mobile VHF Band, 156.8 MHz distress, safety, and calling
156.5625-156.7625 MHz		
156.7625-156.8375 MHz	Maritime mobile (distress and calling)	
156.8375-174 MHz	Fixed mobile	157.6-158.07 MHz Wide-Area, Paging Band, 158.07-160.575 MHz Land, Mobile “MS” band: Mobile, transmit, 158.8 – 160.1 MHz Mobile, Radio Reporter “RR” band, 158.6-158.775 MHz “MS”, Simplex band, 159.1 – 159.375 MHz Bush, winch simplex band, 160.1-160.6 MHz SRD, unrestricted usage, 160.1 - 160.3 MHz Telemetry, and Telecommand, 160.3 - 160.6 MHz Radio, Paging, 160.6-160.875 MHz Maritime, Mobile, 160.925-160.95 MHz Maritime, Mobile, 160.975-161.475 MHz “MS”, Base transmit band, 161.5-162.2 MHz Maritime, Mobile, 162.2-162.46 MHz Fixed “EE”, band, 162.58 - 165.33 MHz Land, Mobile “EE” band, 165.47 - 165.7 MHz Fixed, “EE” band, 165.7 - 166.8 MHz Land, Mobile “EE” band, 166.8 - 167.0 MHz Fixed “EE”, band, 167.18 - 169.93 MHz Land, Mobile “EE” band, 170.05 - 170.3 MHz Fixed, “EE” band, 170.3 – 173 MHz Land Mobile, “EE” band, 173.7 – 173.975 MHz Bush, winch simplex band, 173 - 174 MHz SRDs with, some fixed and land mobile, simplex use
174-223 MHz	Broadcasting	174-230 MHz, Under MR regime (MR49), VHF Television (Band III), Radiomicrophones,
223-230 MHz	Broadcasting (Continued)	174-230 MHz, Under MR regime (MR49), VHF Television (Band III), Radiomicrophones,
230-235 MHz	Fixed mobile Aeronautical Radionavigation	230-300 MHz Government, Service usage
235-267 MHz	Fixed mobile	230-300 MHz Government, Service usage, 235 – 300 MHz SRD, determination, telemetry and telecommand, 243 MHz Search and Rescue, Service,
267-272 MHz	Fixed mobile	230-300 MHz Government, Service usage, 235 – 300 MHz SRD, determination, telemetry and telecommand, 243 MHz Search and Rescue, Service,
272-273 MHz	Fixed mobile	230-300 MHz Government, Service usage, 235 – 300 MHz SRD, determination, telemetry and telecommand, 243 MHz Search and Rescue, Service,
273-312 MHz	Fixed mobile	273 - 300 MHz Government, usage, 300-322 MHz SRD, determination, telemetry and, telecommand
312-315 MHz		300-322 MHz SRD, determination, telemetry and, telecommand,
315-322 MHz		300-322 MHz SRD, determination, telemetry and, telecommand



322-328.6 MHz		300-322 MHz SRD, determination, telemetry and, telecommand
328.6-335.4 MHz	Aeronautical Radionavigation	Aeronautical ILS glidepath, transmitters at airports
335.4-387 MHz	Fixed mobile	335.4-399.9 MHz Government, usage
387-390 MHz		335.4-399.9 MHz Government, usage
390-399.9 MHz		335.4-399.9 MHz Government, usage
399.9-400.05 MHz	Radionavigation Satellite	Mobile Satellite Services
400.05-400.15 MHz	Standard frequency and time signal-Satellite	
400.15-401 MHz	Meteorological aids Meteorological-Satellite (space-to-earth)	Meteorological radio-sondes
401-402 MHz	Meteorological aids Earth exploration-Satellite (earth-to-space) Meteorological-Satellite (earth-to-space) Fixed land mobile	Meteorological Aids
402-403 MHz	Meteorological aids Earth exploration-Satellite (earth-to-space) Meteorological-Satellite (earth-to-space) Fixed	402 – 406 MHz SRDs limited, to biomedical telemetry
403-406 MHz	Meteorological aids Fixed mobile	404 – 406 MHz Fixed “I” band,, 402 – 406 MHz SRDs limited, to biomedical telemetry,, Meteorological Aids,, Government fixed and land, mobile services, Satellite distress beacons, (SDBs)
406-406.1 MHz	Mobile-satellite(earth-To-space)	Land Mobile Trunked dispatch, “TD” band mobile transmit, 406.1-412 MHz,
406.1-410 MHz	Fixed mobile	412 – 414 MHz Fixed “I” band, 413.8 – 414.1 MHz “TD” band, simplex,, 414.1-420 MHz “TD” band, base transmit
410-420 MHz		420-430 MHz Fixed “I” Band,
420-430 MHz	Fixed mobile except aeronautical mobile	Amateur 70cm Band,
430-432 MHz	Radiolocation amateur	433.05 - 434.79 MHz Short, range devices, 435 - 438 MHz Amateur 70cm, Band
432-438 MHz	Radiolocation amateur Amateur satellite	Amateur 70cm Band
438-440 MHz	Radiolocation amateur	440 - 449 MHz, Fixed “JL” band,, 444-445 MHz SRD Biomedical, telemetry usage,
440-450 MHz	Fixed mobile except aeronautical mobile Radiolocation	449.750 - 450 MHz Land, Mobile “CNX” band simplex
450-455 MHz	Fixed mobile	450 - 450.275 MHz Fixed “JC”, Band,, 450.275 - 453.3: MHz Land, mobile “C” band, mobile, transmit,, 453.3 - 453.625: MHz Land, mobile “CNX” band simplex, 453.625 - 454.975 MHz Fixed, “JB” band, 454.975 - 455.3: MHz Land, Mobile “C” Band Simplex, 455.3 - 458.3: MHz Land, Mobile “C” Band base, Transmit,
455-456 MHz		455.3 - 458.3: MHz Land, Mobile “C” Band base, Transmit,, 457.5125 - 457.5875 MHz, Maritime onboard, communications,, 458.34 - 458.53 MHz Land, Mobile “D” Band Simplex,, 458.54-458.61 MHz SRD, unrestricted usage,, 458.61-458.66 MHz Land, Mobile “D” Band Simplex, 458.6625 - 460.0125 MHz, Fixed “JB” and “JNB” Band
456-459 MHz	Fixed mobile	460.025 - 461.425 MHz Fixed, “JD” Band,
459-460 MHz		461.425 - 461.475 MHz Fixed, “JE” Band, 461.475-461.8125 MHz Land, Mobile “DNX” and “DNNX”, Band Simplex Channels, 461.8125-464.8125: MHz Land b, Mobile “DN” and “DNN” Band, Base Transmit, 464.8125-465.1875: MHz Land, Mobile “DNX” and “DNNX”, Band Simplex Channels, 465.1875-465.2375 MHz, Fixed “JF” Band, 465.2375 - 466.6375 MHz, Fixed “JD” Band Beta Transmit, 466.675 - 466.8 MHz Land, Mobile “DNX” and “DNNX”, Band Simplex Channels, 466.8-466.850 MHz Short, range devices, 466.85-467.0 MHz Land, Mobile “DNX” and “DNNX”, Band Simplex Channels, 467.0-470.0 MHz “DN” and, “DNN” Band Mobile Transmit, 467.5125 - 467.5875 MHz, Maritime onboard, communications
460-470 MHz	Mobile fixed	470-470.5 MHz SRD usage, 470.5-471 MHz Land Mobile, “FNX” and “FNNX” Band, Simplex, 471.0 - 471.5 MHz SRD, usage, 471.5-472.0 MHz Land Mobile, “FNX” and “FNNX” Band, Simplex, 472-476.0 MHz Land Mobile, “FN” and “FNN” Band Mobile, Transmit channels, 476.0-476.4 MHz Land Mobile, “FNX” and “FNNX” Band, Simplex, 476.4-477.425 MHz, Personal Radio Service, “PRS” Band, 477.425-477.9875 MHz, Land Mobile “FNNX” and, “FNNX” Band Simplex, 477.9875 - 481.9875 MHz, Land Mobile “FN” and “FNN”, Band Base Transmit, 481.9875-483.9875 MHz, Land Mobile “FNNX” and, “FNNX” Band Simplex, 483.9875 - 487.9875 MHz, Land Mobile “FN” and “FNN”, Band Base Transmit, 487.9875-490.0 MHz, Land Mobile “FNNX” and, “FNNX” Band Simplex, 490.0-494.0 MHz, Land Mobile “FN” and “FNN”, Band Mobile Transmit, 494 - 502 MHz Land Mobile, “ESC” Band reserved for, public safety, UHF Television,, Digital Terrestrial Television, Analog Television (until, December 2013), Summary of Usage, UHF Television,, Digital Terrestrial Television, Analog Television (until, December 2013), under the Management Rights, Regime, Audio/ video senders SRDs, Radiomicrophone SRDs
460-470 MHz (Continued)	Mobile	
470-585 MHz	Mobile Mobile (Continued) 502 - 694 Mhz Broadcasting New zealand Allocation 502 - 694 Mhz Broadcasting (Continued)	
585-610 MHz		

610-890 MHz	694 – 806 Mhz Broadcasting (until december 2013) Mobile (from december 2013) Fixed mobile Mobile fixed Mobile fixed Mobile (Continued)	, 806 - 812 MHz Fixed “KK”, Band (12 x 500 kHz, channelling),, 812 - 813 MHz Land Mobile, “ESD” Band (Emergency, Services) Mobile Transmit,, 813 - 819 MHz Land Mobile, “TS” Band (Trunked Dispatch), Mobile Transmit,, 819 - 824 MHz SRD and, spread spectrum device usage, 824 - 825.015 MHz unused, 825.015 - 840 MHz Cellular, Communication Services, (Private Management Rights), 841 - 851 MHz Fixed “KL”, Band restricted for Studio to, Transmitter Linking,, 851 - 857 MHz Fixed “KK”, Band (12 x 500 kHz, channelling),, 857 - 858 MHz Land Mobile, “ESD” Band (Emergency, Services) Base Transmit, 858 - 864 MHz Land Mobile, “TS” Band (Trunked Dispatch), Base Transmit,, 864 - 868.1 MHz Cordless, Telephone “CT2” Band,, 864 - 870 MHz Short range, devices GURL band,, 868.1 - 869.025 MHz Land, Mobile “TX” Band Simplex, operation,, 869.025 - 870.015 MHz, unused, 870.015 - 890 MHz Cellular, Communication Services, (Private Management, Rights),
890-942 MHz	Fixed mobile Fixed mobile (continued) Fixed mobile	890 - 915 MHz Cellular, Communication Services, (Private Management Rights), 915 - 921 MHz Fixed “K” Band, #NAME?, (STLs), No new Fixed licences, permitted. Allocated for SRDs, from 24 December 2015,, 915 – 921 MHz SRD usage, 921 - 928 MHz ISM, SRD, and G, Amateur usage,, 928 - 935 MHz Fixed “K” Band, #NAME?, (STLs), 935 - 960 MHz Cellular, Communication Services
942-960 MHz		(Private Management Rights)
960-1 164 MHz	Aeronautical Radionavigation	Aeronautical Radionavigation, (Distance Measuring, Equipment and Secondary, Surveillance Radar),
1 164-1 215 MHz		
1 215-1 240 MHz	Radiolocation Radionavigation-satellite	Radiolocation, Radionavigation,
1 240-1 300 MHz	Radiolocation Radionavigation-Satellite amateur	1240-1300 MHz Amateur, Radio,
1 300-1 350 MHz	Aeronautical Radionavigation radiolocation	Aeronautical Radar,
1 350-1 400 MHz	Radiolocation	
1 400-1 427 MHz	Radio astronomy Space research (passive)	Astronomy and Space, Research, All emissions prohibited
1 427-1 429 MHz	Fixed	1427-1429.5 MHz Fixed “LL”, Band for narrow band high, efficiency digital fixed links, 1429-1461.5 MHz Fixed “L”, Band point to point linking
1 429-1 452 MHz		
1 452-1 492 MHz	Fixed broadcasting Broadcasting satellite (Sound)	1461.5-1490 MHz under, Ministerial Directive,, 1490 - 1522 MHz Fixed “L”, band
1 492-1 518 MHz	Fixed	1490 - 1522 MHz Fixed “L”, Band, 1522-1524 MHz Fixed “LL”, Band for narrow band high, efficiency digital fixed links,
1 518-1 525 MHz		
1 525-1 530 MHz	Mobile-satellite (Space-to-earth)	1525 - 1559 MHz Mobile, Satellite service downlink
1 530-1 535 MHz		
1 535-1 559 MHz		
1 559-1 610 MHz	Radionavigation-Satellite (space-to-earth)	1559 - 1610 MHz, Radionavigation Satellite, (space-to-Earth) Global, Positioning System (GPS)
1 610-1 610.6 MHz	Mobile satellite (earth-to-space)	1610 - 1660.5 GHz Mobile, Satellite Service,, 1610 - 1660.5 GHz, Aeronautical Mobile Satellite, Service,, 1610 - 1660.5 GHz Maritime, Mobile Satellite Service
1 610.6-1 613.8 MHz		
1 613.8-1 626.5 MHz		
1 626.5-1 660 MHz	Mobile-satellite (earth-to-space)	1626.5 - 1660 MHz Mobile, Satellite (Earth-to-Space) -, INMARSAT uplinks paired with, 1525 - 1559 MHz
1 660-1 660.5 MHz	Radio astronomy	
1 660.5-1 668 MHz	Radio astronomy Space research (passive) Meteorological aids	
1 668-1 668.4 MHz		
1 668.4-1 670 MHz		
1 670-1 675 MHz	Meteorological aids Fixed Meteorological-Satellite (space-to-earth) Mobile	Meteorological satellite, downlinks
1 675-1 690 MHz	Meteorological-Satellite (space-to-earth)	Meteorological Satellite
1 690 - 1 700 MHz		
1 700-1 710 MHz		
1 710-1 930 MHz	Fixed mobile	1710 - 1880 MHz Cellular, communication services, (Private Management Rights), 1880 - 1900 MHz DECT, cordless telephone systems,, 1895 - 1920 MHz PHS, cordless telephone systems,, 1920 - 1980 MHz Cellular, communication services
1 930-1 970 MHz		(Private Management Rights)
1 970-1 980 MHz		
1 980-2 010 MHz	Fixed mobile Mobile-satellite (earth-to-space)	Mobile Satellite Service uplink
2010-2 025 MHz	Fixed mobile	2010 - 2025 MHz TDD, 3G, cellular technologies and fixed, services (Private Management, Rights),
2 025-2 110 MHz		2025-2110 MHz Fixed, Wireless Access and Fixed, services (Private Management, Rights)



2 110-2 120 MHz		2110-2170 MHz Cellular, communication services, (Private Management Rights)
2 120-2 160 MHz		
2 160-2 170 MHz		
2 170-2 200 MHz	Fixed mobile Mobile-satellite (space-to-earth)	
2 200-2 290 MHz	Fixed mobile	2200 - 2300 MHz Private, Management Rights - suitable, for FWA and fixed services
2 290-2 300 MHz		
2 300-2 450 MHz	Fixed mobile amateur	2300 - 2395 MHz Private, Management Rights - suitable, for MMDS, FWA or Fixed, services, 2396-2450 MHz Amateur, radio usage, 2400 – 2483.5 MHz ISM, band, short range devices
2 450-2 483.5 MHz	Fixed mobile	
2 483.5-2 500 MHz	Fixed mobile Mobile-satellite (Space-to-earth)	Mobile Satellite Service, downlink
2 500-2 520 MHz	Fixed mobile	2500 - 2690 MHz, Private Management Rights for, cellular and FWA services, 2575 – 2620 MHz, Managed Spectrum Park for, local wireless services
2 520-2 535 MHz		
2 535-2 655 MHz	Fixed mobile	
2 655-2 670 MHz		
2 670-2 690 MHz		
2 690-2 700 MHz	Radio astronomy Space research	Astronomy, Space Research
2 700-2 900 MHz	Aeronautical Radionavigation RadiolocationFixed under irr 4.4	2700-2900 Fixed “OX” band, Itinerant fixed linking for, Television outside broadcast, operations
2 900-3 100 MHz	Radionavigation Radiolocation	2900 - 3400 MHz SRD use, limited to radiolocation
3 100-3 300 MHz	Radiolocation	
3 300-3 400 MHz	Radiolocation amateur	2900 - 3400 MHz SRD use, limited to radiolocation, 3300 – 3410 MHz Amateur, radio usage
3 400-3 500 MHz	3400 - 3410 Mhz radiolocation Amateur amateur satellite 3410 - 3500 Mhz Fixed mobile	3410 – 3487 MHz, Under Management Rights, regime,
3 500-3 600 MHz	3500 - 3589 Mhz fixed Radiolocation 3589 - 3600 Mhz Fixed Fixed-satellite (Space-to-earth)	3510 – 3587 MHz Under Management Rights, regime, 3589 – 3600 MHz Fixed, Satellite “C” Band downlink
3 600-3 700 MHz	Fixed Fixed-satellite (Space-to-earth)	3600 - 4200 MHz, Fixed ‘P’ band - usage must be, co-ordinated with satellite, earth stations operating in this, band.
3 700-4 200 MHz	Fixed Fixed-satellite(space-to-earth)	
4 200-4 400 MHz	Aeronautical Radionavigation	Radio Altimeters and, associated ground, transponders
4 400-4 500 MHz	Fixed	4400 – 5000 MHz Fixed “5, GHz” Band,
4 500-4 800 MHz		4500 – 4800 MHz Planned fixed satellite service (space-, to-Earth) as per IRR
4 800-4 990 MHz		
4 990-5 000 MHz		
5 000-5 010 MHz		
5 010-5 030 MHz		
5 030-5091 MHz	Radiolocation Radionavigation	
5 091-5150 MHz	Radiolocation Radionavigation	
5 150-5 250 MHz	Aeronautical Radionavigation Mobile except aeronautical Mobile	5150 – 5350 MHz SRD, usage, wireless LAN systems,
5 250-5 255 MHz		
5 255- 5 350 MHz	Mobile except aeronautical Mobile	5150 – 5350 MHz SRD, usage, wireless LAN systems
5 350-5 460 MHz	Aeronautical Radionavigation	5350 – 5470 MHz Airborne, Doppler radar
5 460-5 470 MHz		
5 470-5 570 MHz	Maritime Radionavigation Mobile except aeronautical Mobile radiolocation	5 470-5 725 MHz SRD usage, GURL for radiolocation and, wireless LAN, 5 470-5 650 MHz Ground, based Meteorological RADAR
5 570-5 650 MHz		
5 650-5 725 MHz	Radiolocation Mobile except aeronautical Mobile amateur	5 470 – 5 725 MHz SRD, GURL for radiolocation and, wireless LAN, 5 650 – 5850 MHz Amateur, radio GURL,
5 725-5 830 MHz		5 725 – 5 875 MHz ISM band,, SRD GURL, 5 725 – 5 825 MHz Fixed, radio links GURL
5 830-5 850 MHz	Radiolocation amateur Amateur satellite(space-to- earth)	
5 850-5 925 MHz	Fixed Fixed-satellite (earth-to-space) mobile	5 725 – 5 875 MHz ISM band,, SRD GURL, 5850 – 6725 MHz Fixed, Satellite Service “C” band, uplink,
5 925-6 700 MHz	Fixed Fixed-satellite (earth-to-space)	5925 - 6420 MHz Fixed “R” band, 6420 - 7100 MHz Fixed “T”, band

6 700-7 075 MHz	Fixed Fixed-satellite (earth-to-Space) (space-to-earth)	6420 – 7100 MHz Fixed “T”, band, 6725 – 7025 MHz Fixed, Satellite Service
7 075-7 145 MHz	Fixed	6420 – 7100 MHz Fixed “T”, band, 7100 – 7425 MHz Fixed “V”, Band utilised for point to point linking and itinerant TV outside, broadcasting
7 145-7 235 MHz	Fixed	
7 235-7 250 MHz	Fixed	
7 250-7 300 MHz	Fixed	
7 300-7 450 MHz	Fixed	7425 – 7730 MHz Fixed “U”, Band for point-to-point linking
7 450-7 550 MHz	Fixed	7425 – 7730 MHz Fixed “U”, Band for point-to-point linking
7 550-7 750 MHz	Fixed	7730 – 8290 MHz Fixed “W”, Band for point-to-point linking
7 750-7 850 MHz	Fixed	
7 850-7 900 MHz	Fixed	
7 900-8 025 MHz	Fixed	
8 025-8 175 MHz	Fixed	
8 175-8 215 MHz	Fixed	7730 – 8290 MHz Fixed “W”, Band
8 215-8 400 MHz	Fixed	8290 – 8500 MHz Fixed “Y”, band
8 400-8 500 MHz	Fixed	
8 500-8 550 MHz	Radiolocation	8500 – 10600 MHz SRD, GURL
8 550-8 650 MHz		
8 650-8 750 MHz		
8 750-8 850 MHz	Radiolocation Aeronautical Radionavigation	8750 – 8850 MHz GURL for, airborne Doppler radar, 8500 – 10600 MHz SRD, GURL
8 850-9 000 MHz	Radiolocation maritime Radionavigation	8500 – 10600 MHz SRD, GURL
9 000-9 200 MHz	Aeronautical Radionavigation Radiolocation	
9 200-9 300 MHz	Radiolocation maritime Radionavigation	8500 – 10600 MHz SRD, GURL, 9200 – 9500 MHz Maritime, Radionavigation (RADAR)
9 300-9 500 MHz	Radionavigation radiolocation	
9 500-9 800 MHz	Radiolocation	8500 – 10600 MHz SRD, GURL
9 800-9 900 MHz		
9 900-10 000 MHz		
10-10.45 GHz	Radiolocation amateur	10.00 – 10.50 GHz, Amateur radio GURL, 8500 – 10600 MHz SRD, GURL
10.45-10.5 GHz	Radiolocation	8500 – 10600 MHz SRD, GURL,
10.5-10.55 GHz	Radiolocation fixed	10.5 – 10.68 GHz Fixed “H” Band
10.55-10.6 GHz		
10.6-10.68 GHz		
10.68-10.7 GHz	Radio astronomy Space research (passive)	Space Research (passive)
10.7-11.7 GHz	Fixed	10.7 – 11.7 GHz Fixed “Z”, Band
11.7-12.2 GHz	Broadcasting satellite	11.7 – 12.75 GHz Satellite Ku, band downlink, 11.7 – 12.2 GHz under, Ministerial Directive, Broadcast satellite service
12.2-12.5 GHz	Broadcasting (including Datacasting) Fixed satellite (space-to-Earth)	Fixed Satellite “Ku” Band, downlink, Broadcast Satellite “Ku” Band, downlink, Freeview and Sky TV satellite, service
12.5-12.75 GHz	Broadcasting satellite Fixed-satellite(space-to-earth)	Broadcast Satellite “Ku” Band, downlink, Freeview and Sky TV satellite, service
12.75-13.25 GHz	Fixed earth exploration-satellite (active) aeronautical Radionavigation Space research (active)	Fixed “X” Band, Aeronautical Radionavigation, GURL for Airborne Doppler, radar
13.25-13.4 GHz		
13.4-13.75 GHz	Earth exploration-Satellite (active) Radiolocation Space research	Government radiolocation, usage
13.75-14 GHz	Fixed satellite(earth-to-space)	
14-14.25 GHz	Fixed-satellite(earth-to-space) Mobile-satellite(earth-to-space)	Fixed Satellite “Ku” Band, uplink, 14 - 14.25 GHz Maritime, Mobile Satellite Service, 14 - 14.5 GHz Aeronautical, Mobile Satellite Service, 14 - 14.5 GHz Mobile Satellite Service
14.25-14.3 GHz	Fixed-satellite(earth-to-space) mobile-satellite (earth-to-space)	
14.3-14.4 GHz	Fixed-satellite (earth-to-Space) mobile-satellite(earth-to-space)	14 - 14.5 GHz Aeronautical, Mobile Satellite Service, 14 - 14.5 GHz Mobile Satellite, Service
14.4-14.47 GHz	Fixed-satellite (earth-to-Space) mobile-satellite (earth-to-space)	
14.47-14.5 GHz	Fixed-satellite (earth-to-space) mobile-satellite (earth-to-space)	
14.5-14.8 GHz	Fixed	14.5 – 15.35 GHz Fixed “G”, Band
14.8-15.35 GHz	Fixed	14.5 – 15.35 GHz Fixed “G”, Band



15.35-15.4 GHz	Radio astronomy Space research (passive)	
15.4-15.43 GHz	Aeronautical Radionavigation	
15.43-15.63 GHz	Fixed-satellite (space-to-Earth) (earth-to-space) Aeronautical Radionavigation	
15.63-15.7 GHz	Aeronautical Radionavigation	
15.7-16.6 GHz	Radiolocation	15.70 – 17.30 GHz SRD, usage
16.6-17.1 GHz	Radiolocation Space research (deep space) (Earth-to-space)	15.70 – 17.30 GHz SRD, usage,
17.1-17.2 GHz	Radiolocation	15.70 – 17.30 GHz SRD, usage,
17.2-17.3 GHz	Earth exploration-Satellite (active) Radiolocation Space research (active)	15.70 – 17.30 GHz SRD, usage,
17.3-17.7 GHz	Fixed-satellite (earth-to-Space) radiolocation	
17.7-18.1 GHz	Fixed	17.7 – 19.7 GHz Fixed “18G”, Band
18.1-18.4 GHz	Fixed	17.7 – 19.7 GHz Fixed “18G”, Band
18.4-18.6 GHz	Fixed	17.7 – 19.7 GHz Fixed “18G”, Band
18.6-18.8 GHz	Fixed	17.7 – 19.7 GHz Fixed “18G”, Band
18.8-19.3 GHz	Fixed	17.7 – 19.7 GHz Fixed “18G”, Band
19.3-19.7 GHz	Fixed	
19.7-20.1 GHz		
20.1-20.2 GHz		
20.2-21.2 GHz		
21.2-21.4 GHz	Fixed	21.2 – 23.6 GHz Fixed “23G”, Band
21.4-22 GHz	Fixed	
22-22.21 GHz	Fixed	21.2 – 23.6 GHz Fixed “23G”, Band, 22 - 26.625 GHz Vehicular, Radar
22.21-22.5 GHz	Fixed	
22.5-22.55 GHz	Fixed	
22.55-23.55 GHz	Fixed	
23.55-23.6 GHz	Fixed	
23.6-24 GHz	Radio astronomy Space research (passive)	
24-24.05 GHz	Amateur Amateur-satellite	Amateur usage, 24 – 24.25 GHz ISM band,, SRD usage, 22 – 26.625 GHz Vehicular, Radar
24.05-24.25 GHz	Radiolocation Amateur	Amateur usage, 24 – 24.25 GHz ISM band,, SRD usage, 22 – 26.625 GHz Vehicular, Radar
24.25-24.45 GHz	Radionavigation Fixed Mobile	
24.45-24.65 GHz	Fixed Mobile Radionavigation	24.549 – 25.392 GHz Private, Management Rights suitable, for LMDS and Fixed services, 22 – 26.625 GHz Vehicular, Radar
24.65-24.75 GHz	Fixed Mobile	
24.75-25.25 GHz	Fixed Mobile	
25.25-25.5 GHz	Fixed Mobile	22 – 26.625 GHz Vehicular, Radar
25.5-27 GHz	Earth exploration- Satellite (space-to earth) Fixed Inter-satellite Mobile Standard frequency and time Signal-satellite (earth-to-Space)	25.557 – 28.35 GHz Private, Management Rights suitable, for LMDS and Fixed services, 22 – 26.625 GHz Vehicular, Radar
27-27.5 GHz	Fixed Fixed-satellite (earth-to-Space) Inter-satellite Mobile	
27.5-28.5 GHz	Fixed Fixed-satellite (earth-to-Space) Mobile	
28.5-29.1 GHz	Fixed Fixed-satellite (earth-to-Space) Mobile	
29.1-29.5 GHz	Fixed Fixed-satellite (earth-to-Space) Mobile	
29.5-29.9 GHz		
29.9-30 GHz	Fixed-satellite (earth-to-Space) Mobile-satellite (earth-to-space)	
30-31 GHz	Fixed-satellite (earth-to- Space) Mobile-satellite (earth-to-space)	
31-31.3 GHz	Fixed	
31.3-31.5 GHz	Radio astronomy Space research (passive)	
31.5-31.8 GHz	Radio astronomy Space research (passive) Fixed Mobile except aeronautical Mobile	
31.8-32 GHz	Fixed Radionavigation	
32-32.3 GHz	Fixed Radionavigation	
32.3-33 GHz	Fixed Radionavigation	
33-33.4 GHz	Fixed Radionavigation	
33.4-34.2 GHz	Radiolocation	33.4 – 36 GHz SRD usage
34.2-34.7 GHz	Radiolocation	
34.7-35.2 GHz	Radiolocation	
35.2-35.5 GHz	Meteorological aids Radiolocation	
35.5-36 GHz	Meteorological aids Radiolocation Space research (active)	
36-37 GHz	Fixed Mobile Space research	
37-37.5 GHz	Fixed	
37.5-38 GHz	Fixed	
38-39.5 GHz	Fixed	
39.5-40 GHz	Fixed	

40-43.5 GHz		46.7 – 46.9 GHz SRD usage
47-47.2 GHz	Amateur Amateur-satellite	Amateur radio usage
47.2-50.4 GHz		
50.4-51.4 GHz	Fixed	50.4 – 51.15 GHz Fixed “50G”, Band
51.4-52.6 GHz		
52.6-54.25 GHz		
54.25-55.78 GHz	Space research (passive)	
55.78-56.9 GHz		
56.9-57 GHz		
57-58.2	Fixed Mobile	57 – 66 GHz SRD usage
58.2-59 GHz	Fixed Mobile	57 – 66 GHz SRD usage, 61 – 61.5 GHz ISM band
59-71 GHz		
71-74 GHz	Fixed	71.125 – 75.875 GHz Fixed PI, “80G” Band
74-76 GHz		75.5 – 81 GHz Amateur radio usage
76-77.5 GHz		76 – 77 GHz SRD usage, 75.5 – 81 GHz Amateur radio, usage
77.5-78 GHz	Amateur Amateur-satellite	75.5 – 81 GHz Amateur radio, usage
78-79 GHz	Amateur Amateur-satellite	75.5 – 81 GHz Amateur radio, usage
79-81 GHz		
81-84 GHz	Fixed Radiolocation Amateur Amateur-satellite	81.125 – 85.875 GHz Fixed “80G” Band
84-86 GHz	Fixed Radiolocation Amateur Amateur-satellite	
86-92 GHz		
92-94 GHz		All emissions prohibited
94-102 GHz		
102-105 GHz		All emissions prohibited
105-109.5 GHz		
109.5-111.8 GHz		
111.8-114.25 GHz		All emissions prohibited
114.25-116 GHz		
116-119.98 GHz		
119.98-122.25 GHz		122 – 123 GHz ISM band,, SRD usage,
122.25-123 GHz		122 – 123 GHz ISM band, SRD usage, Amateur radio usage
123-130 GHz		
130-134 GHz		
134-136 GHz	Amateur Amateur-satellite	134 – 141 GHz Amateur radio usage,
136-200 GHz		
191.8-200 GHz		
200-202 GHz		All emissions prohibited
202-209 GHz		All emissions prohibited
209-241 GHz		
241-248 GHz	Radiolocation Amateur Amateur-satellite	241-250 GHz Amateur radio usage, 244-246 GHz ISM band, SRD usage
248-250 GHz	Amateur Amateur-satellite	241 – 250 GHz Amateur radio usage
250-1000 GHz		

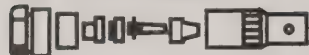
Abbreviation	Meaning
(OR)	Off-route, used in conjunction with Aeronautical Mobile Service
(R)	En-route, used in conjunction with Aeronautical Mobile Service
AMPS	Advanced Mobile Phone System
Cospas – Sarsat	International Satellite System for Search and Rescue
DAMPS	Digital Advanced Mobile Phone System
DECT	Digital Enhanced Cordless Telecommunications
DGPS	Differential Global Positioning System used for correcting dithered GPS signals to improve accuracy.
DSC	Distress and Safety Calling
DTH	Direct to Home (reception), used in conjunction with the Fixed Satellite Service
EPIRB	Emergency Position Indicating Radio Beacon
FWA	Fixed Wireless Access
GMDSS	Global Maritime Distress and Safety System
GPS	Global Positioning System

Abbreviation	Meaning
GSM	Global System for Mobile communications
ILS	Instrument Landing System
IRR	International Radio Regulations
ISM	Industry, Scientific, and Medical
ITU	International Telecommunications Union
LMDS	Local Multipoint Distribution Service
MLS	Microwave Landing System
MR #	Management Right (the # signifies an integer identification number).
NDB(s)	Non-Directional Beacon(s)
PCS	Personal Communications System
PHS	Personal Handyphone System
PRS	Personal Radio Service
RADAR	Radio Detection And Ranging
RLAN	Radio Local Area Network
SAR	Search And Rescue
SRD(s)	Short Range Device(s), also known as Restricted Radiation Device(s) or RRD(s)
VSAT	Very Small Aperture Terminals



# COAXIAL PLUG ASSEMBLY

## BNC Type (Female)



Step 1:  
Cut end of cable evenly and remove 8 mm of outer sheath.



Step 2:  
Slide clamp nut and pressure sleeve over cable, and comb out braid.



Step 3:  
Fold braid back and insert ferrule between braid and dielectric. Trim off excess braid.



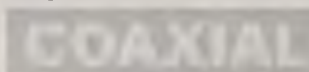
Step 4:  
Remove 5 mm of dielectric without damaging centre conductor. Tin conductor.



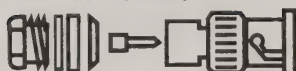
Step 5:  
Slide rear insulator over conductor hard against rear insulator. Solder contact to conductor.



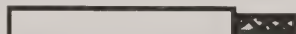
Step 6:  
Fit front insulator in body and push sub-assembly onto body. Slide pressure sleeve into body and screw in the clamp nut to clamp cable.



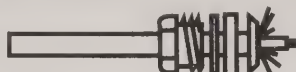
## BNC Type (Male)



Step 1:  
Cut end of cable evenly, and remove 7 mm of outer sheath.



Step 2:  
Slide clamp-nut, washer and rubber spacer over cable. Slide pressure sleeve over braid, and fan out braid.



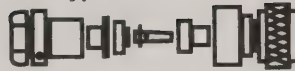
Step 3:  
Fold back braid against pressure sleeve and trim off excess. Strip 4 mm of inside insulation off centre wire. Solder pin onto centre wire.



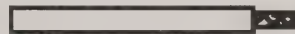
Step 4:  
Fit assembly, pin first, into main receptacle. Push washer, rubber spacer and clamp nut up and screw into place.



## "N" Type



Step 1:  
Cut end of cable evenly and remove 9 mm of outer sheath.



Step 2:  
Slide clamp nut and pressure sleeve over cable, and comb out braid.



Step 3:  
Fold braid back and insert ferrule between braid and dielectric. Trim off excess braid and remove 5.5 mm dielectric without damaging inner conductor. Tin end of conductor.



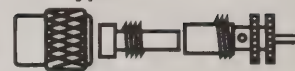
Step 4:  
Slide rear insulator over conductor and position against end of dielectric. Slide contact over conductor until hard against rear insulator. Solder contact to conductor.



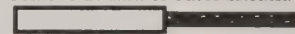
Step 5:  
Fit front insulator in body and push sub-assembly into body. Slide pressure sleeve into body and screw in the clamp nut to clamp cable.



## UHF Type



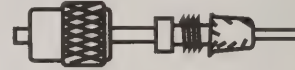
Step 1:  
Cut end of cable evenly and remove 27 mm of outer sheath.



Step 2:  
Slide coupling ring and adaptor onto sheath. Fan braid back over sheath.



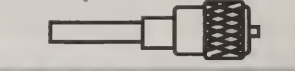
Step 3:  
Compress braid around cable and position adaptor so braid fans over adaptor. Trim off excess braid.



Step 4:  
Remove 12.5 mm dielectric and tin conductor. Screw the plug assembly onto cable and solder plug to braid through solder holes.



Step 5:  
Solder conductor to centre pin and screw coupling ring onto assembly.



# COAXIAL CABLE SPECIFICATIONS

Type	Nom. Imp Zo	Outer Dia (mm)	Nominal Attenuation (dB/100 m)					Vel Factor %	Cap pF/m	Volts Vrms
			50 MHz	100 MHz	200 MHz	400 MHz	1 GHz			
RG-8/U	52	10.3	5.2	7.2	10.5	15.4	29.2	66.0	96.8	5000
RG-9/U	51	10.67	5.2	7.2	10.5	15.4	29.2	66.0	67.3	5000
RG-11/U	75	10.29	4.3	6.6	9.5	13.8	22.3	66.0	67.3	5000
RG-58/U	53.5	4.95	10.2	14.8	22.3	32.8	55.8	66.0	93.5	1900
RG-58A/U	50	4.95	10.8	16.1	23.9	37.7	70.5	66.0	101.0	1900
RG-58C/U	50	4.95	10.8	16.1	23.9	37.7	70.5	66.0	101.0	1900
RG-59/U	73	6.15	7.9	11.2	16.1	23.3	39.4	66.0	68.9	2300
RG-59B/U	75	6.15	7.9	11.2	16.1	23.0	39.4	66.0	67.3	2300
RG-62/U	93	6.04	6.2	8.9	12.5	17.7	28.5	84.0	44.3	700
RG-62B/U	93	6.15	6.6	9.5	13.8	20.0	36.1	84.0	44.3	700
RG-122/U	50	4.06	14.8	23.0	32.8	49.9	87.0	66.0	101.0	1900
RG-141A/U	50	4.06	6.9	10.5	15.4	22.6	41.7	69.5	95.1	1900
RG-142B/U	50	4.95	8.9	12.8	18.4	26.9	44.3	69.5	95.2	1900
RG-174/U	50	2.56	21.7	29.2	39.4	57.4	98.4	66.0	101.0	1500
RG-178B/U	50	1.83	34.4	45.9	62.3	91.9	150.9	69.5	95.1	1000
RG-178B/U	75	2.54	27.9	32.8	41.0	52.5	78.7	69.5	64.0	1200
RG-180B/U	95	3.56	15.1	18.7	24.9	35.1	55.8	69.51	49.2	1500
RG-187A/U	75	2.66	37.9	32.8	41.0	52.5	78.7	69.5	64.0	1200
RG-188A/U	50	2.59	31.5	37.4	46.6	54.8	101.7	69.5	95.2	1200
RG-196A/U	50	1.93	34.4	45.9	62.3	91.9	150.9	95.2	1200	
RG-213/U	50	10.29	5.2	7.2	10.5	15.4	29.2	66.0	101.0	5000
RG-214/U	50	10.8	5.2	7.2	10.5	15.4	29.2	66.0	101.0	5000
RG-223/U	50	5.38	10.1	14.8	21.0	30.2	63.5	66.0	101.0	1900
RG-303/U	50	4.31	6.9	10.5	15.4	22.6	42.7	69.5	95.2	1900
RG-316/U	50	2.49	30.8	34.1	43.3	54.1	101.7	69.5	95.2	1200
BEL 9913	50	10.29	3.0	4.5	5.9	8.5	14.8	84.0	78.7	—

NB: Except for Belden 9913, all specifications are referenced to MIL-C-17D/F or JAN-C-17A as applicable.

# COMMONLY USED SYMBOLS & ABBREVIATIONS

A	ampere, amplification factor	CRT	cathode-ray tube		conductance; magneto motive force
AC	alternating current	ct	centre tap	GaAs FET	gallium arsenide field-effect transistor
A/D	analogue-to-digital	CTCSS	continuous tone coded squelch system	GDO	grid-dip or gate-dip oscillator
AF	audio frequency	CW	continuous wave (code); clockwise	GHz	gigahertz
afc	automatic frequency control			gnd	ground
afsk	audio frequency shift keying			GPRS	General Packet Radio Service
agc	automatic gain control			GPS	Global Positioning System
Ah	ampere hour			GSM	Globa System for Mobile Systems
alc	automatic load (or level) control	D	electrostatic displacement; flux density		
AM	amplitude modulation	D/A	digital-to-analogue	H	henry; magnetic field strength
a.m.	morning	dB	decibel	HAAT	height above mean terrain
AMSAT	Radio Amateur Satellite Corporation	dBd	antenna gain referenced to a dipole	HF	high frequency (3–30 MHz)
AMTOR	Amateur Teleprinting Over Radio	DBDM	double-balance diode mixer	HFO	heterodyne-frequency oscillator
anl	automatic noise limiter	dBi	antenna gain referenced to an isotropic, a dipole has a gain of 2.14 dB	hpf	highest possible frequency; high pass filter
ant	antenna	dBm	decibel referred to 1 milliwatt	HT	high tension
AOS	acquisition of signal	dBW	decibel referred to 1 watt	H <sub>z</sub>	hertz
ARA	Amateur Radio Association	DC	direct current		
ARC	Amateur Radio Club	det	detector	I	current
AREC	Amateur Radio Emergency Corps	DF	direction finder; direction finding	IARU	International Amateur Radio Union
ARS	Amateur Radio Society; Amateur Radio Station	DIP	dual-in-line package, 14 to 16 pins	IC	integrated circuit
ASCII	American National Standard Code for Information Interchange	dpdt	double-pole double-throw	i-d	identification; identifier
ATV	amateur television	dpst	double-pole single-throw	ID	inside diameter
avc	automatic volume control	dsb	double sideband	IF	intermediate frequency
AWG	American wire gauge	DTL	diode-transistor logic	IMD	inter-modulation distortion
az-el	azimuth-elevation	DTMF	dual tone multi-frequency	I/O	input/output
		DVM	digital voltmeter	IRC	international reply coupon
		DX	long distance	ISB	independent sideband
		DXCC	DX Century Club	ITU	International Telecommunication Union
				IW	Intruder Watch (Monitoring Service)
B	flux density; susceptance	E	voltage	J	Joule
BASIC	Beginner's All-purpose Symbolic Instruction Code (computer language)	e	base of Naperian logs	j	indicator for reactive component of an impedance; (+j inductive; -j capacitive); joule
b	byte (a group of bits or binary digits, usually eight)	ECL	emitter-coupled logic	JFET	junction field-effect transistor
bc	broadcast	ECO	electron-coupled oscillator		
BCD	binary-coded-decimal	EHF	extra high frequency (30–300 GHz)	k	kilo (1000)
BCI	broadcast interference	EHT	extra high tension	K	kilobyte; specific inductive capacity; Kelvin; dielectric constant
bcl	broadcast listener	eirp	effective isotropic radiated power	kg	kilogram
bd	baud (bits/sec)	EMC	electro-magnetic capability	kHz	kilohertz (10 <sup>3</sup> )
ber	bit error rate	E-M-E	earth-moon-earth (moonbounce)	km	kilometre
bit	binary digit	emf	electromotive force (voltage)	kV	kilovolt
BFO	beat-frequency oscillator	EMI	electro-magnetic interference	kW	kilowatt
bpf	band pass filter	EMP	electromagnetic pulse	kWh	kilowatt hour
bw	bandwidth	EPRM	erasable programmable read-only memory		
byte	computer word, 8 bits	EUV	extreme ultra-violet radiation	L	self inductance
		EQX	equator crossing	LC	inductance-capacitance
		erp	effective radiated power	LCD	liquid crystal display
C	Celsius, capacity, Coulomb	f	frequency	LED	light-emitting diode
c	velocity of EM waves	F	farad; Fahrenheit	LF	low frequency (30–300 kHz)
CATV	cable television	FAX	facsimile	lhcp	left-hand circular polarisation
CB	citizens band	FCC	Federal Communications Commission	LO	local oscillator
CCIR	International Radio Consultative Committee	FD	Field Day	loran	long-range navigation
CCIT	Consultative Committee for International Telegraph and Telephone (ITU)	FET	field-effect transistor	LOS	loss of signal
CCS	constant current source	FF	flip-flop	lp	long periodic; long path
cctv	closed circuit television	FM	frequency modulation	LSB	lower sideband; least significant bit
ccw	coherent CW; counter-clockwise	FMT	frequency measuring test	LSI	large-scale integration
CD	Civil Defence	FMTAG	Frequency Management Technical and Advisory Group	LT	low tension
Ch	channel	fot	optimum working frequency	luf	lowest usable frequency
cm	centimetre	fsd	full scale deflection	lw	longwave; long wire
CMOS	(or COSMOS)—complimentary-symmetry metaloxide semiconductor	FSK	frequency-shift keying		
coax	coaxial cable or connector				
COR	carrier-operated relay	g	gram		
CPU	central processing unit	G	giga (10 <sup>9</sup> );		
CQ	general call to all stations				



m	metre (distance or band); milli (10 <sup>-3</sup> ); mass	p.m. PMOS	afternoon/night p-channel MOS	TE	trans-equatorial (propagation)
M	mega (10 <sup>6</sup> ); mutual inductance	pnp	positive-negative-positive	tfc	traffic
mA	milliampere (one-thousandth of an Amp)	ppi	plan position indicator (radar)	THz	tetrahertz (1012)
mAH	milliamper hour	pot	potentiometer	THD	total harmonic distortion
MARS	Military Affiliate Radio System	PROM	programmable read-only memory	tpi	turns per inch
MATV	multi-access television	PRV	peak reverse voltage	T-R	transmit-receive
MF	medium frequency (300-3000 kHz)	PSK	phase-shift keying	TTL; T2L	transistor-transistor logic
mH	millihenry	PTO	permeability-tuned oscillator	TTY	teletypewriter (from Teletype, the trade mark of Teletype Corporation)
MHz	megahertz (106)	PTT	push-to-talk	TV	television
mike; mic	microphone	PSU	power supply unit	TVI	television interference
mini-DIP	dual-in-line package of 8 pins			Tx	transmitter
mi/h	miles per hour	Q	figure of merit (tuned circuits); charge; quantity	UHF	ultra-high frequency (300-3000 MHz)
mi/s	miles per second	QRP	low power (less than 10 watts input)	UJT	uni-junction transistor
mix	mixer	QTHR	address correct in <i>Call Book</i>	UoSAT	University of Surrey
mm	millimetre				educational/research satellite (Great Britain)
MO	master oscillator			USB	upper sideband
MOS	metal oxide semiconductor	R	resistance	UTC	Universal Co-ordinated Time
mod	modulator	RAM	random access memory	uV	ultra-violet light
modem	modulator/demodulator	R/C	radio control		
MOX	manually operated switching	R-C	resistor-capacitor	V	volt; voltage
ms	millisecond	rcvr	receiver	VA	Volt-Ampere
m.s.	meteor scatter	rev/min	revolutions per minute	VCO	voltage-controlled oscillator
m/s	metres per second	RF	radio frequency	VCR	video cassette recorder
MSB	most significant bit	RFC	radio-frequency choke	VCXO	voltage-controlled crystal oscillator
MSI	medium-scale integration	RFI	radio-frequency interference	VFBO	variable-frequency beat oscillator
MSTV	medium-scan television	rhcp	right-hand circular polarisation	VFO	variable frequency oscillator
MUF	maximum usable frequency	RI	Radio Inspector	VHF	very-high frequency (30-300 MHz)
MUX	multiplex; multiplexer	RIT	receiver incremental tuning	VLSI	very large scale integration
mV	millivolt	RLC	resistor, inductance, capacitor network	VOM	volt-ohm-milliammeter
mW	milliwatt	rms	root-mean-square	VOX	voice-operated switching
		RO	Radio Officer	VR	voltage regulator
N	modulation factor	ROM	read-only memory	VSWR	voltage standing-wave ratio
n	nano (10 <sup>-9</sup> )	rprr	repeater	VTVM	vacuum-tube voltmeter
nbfm	narrow-band frequency modulation	RS	Radiosport Satellite (USSR)	VU	volume unit
nbvm	narrow-band voice modulation	RSGB	Radio Society of Great Britain	VXO	variable crystal oscillator
n.c.	no connection	RST	readability-strength-tone		
NC	normally closed	RT	radiotelephone	W	watt; work
NF	noise figure	RTL	resistor-transistor logic	WAC	Worked All Continents
NiCad	nickel cadmium	RTTY	radioteletype	WARC	World Administrative Radio Conference
NL	noise limiter	Rx	receiver	WAS	Worked All States
NMOS	n-channel MOS			wbfm	wide-band FM
NO	normally open	S	second; magnetic reluctance; Siemens	Wh	watt-hours
nnp	negative-positive-negative	SAE	self-addressed envelope	wpm	words per minute
nS	nanosecond	SASE	stamped SAE	ww	wire wound; wire wrap
NZART	New Zealand Association of Radio Transmitters	SCR	silicon-controlled rectifier	wx	weather
		SHF	super-high frequency (3-30 GHz)		
OD	outside diameter	SINAD	Ratio of Signal to Noise and Distortion	X	reactance; electrostatic field strength
OM	old man	SM	silver mica (capacitor)	xcvr	transceiver
op amp	operational amplifier	SNR; S/N	signal-to-noise ratio	XO	crystal oscillator
osc	oscillator	spdt	single-pole double-throw	xfmr	transformer
OSCAR	Orbiting Satellite Carrying Amateur Radio	spst	single-pole single-throw	xmtr	transmitter
OTC	Old Timers' Club	SS	sweepstakes; spread spectrum	xtal	crystal
oz	ounce	SSB	single sideband	XYL	wife
		SSC	AMSAT Phase III special service channels		
p	pico (10 <sup>-12</sup> )	SSI	small-scale integration	Y	admittance
P	power	SSTV	slow-scan television	YF	wife
PA	power amplifier; public address system	STSP	short-term special purpose (FM repeaters)	YL	young lady or lady operator
PAM	pulse amplitude modulation	SWL	shortwave listener		
PCB	printed (or etched) circuit board	SWR	standing-wave ratio	Z	impedance; UTC time
PCM	pulse code modulation	sync	synchronous; synchronising		
PEP	peak envelope power	SYNCART	synchronous satellite carrying Amateur Radio Transponder		
pF	picofarad				
ph	phone	t	time; temperature C		
PIN	positive intrinsic negative	T	period; temperature K		
PIV	peak inverse voltage	TA	technical adviser		
pk	peak	TCA	time of closest approach		
pk-pk	peak to peak				
PLL	phase-locked loop				
PM	phase modulation				

Conversion Factors (Metric-Imperial)

1 millimetre (mm)	= 0.03937 inch
1 centimetre (cm) = 10mm	= 0.3937 inch
1 metre (m) = 100cm	= 39.37 inches, 3.28 feet, 1.094 yards
1 kilometre (km) = 1000m	= 3280.8 feet, 1094 yards, 0.621 miles
1 gram (g) = 1000mg	= 0.03574 ounces
1 kilogram (kg) = 1000g	= 2.2046 pounds
1 tonne (t) = 1000kg	= 0.98 ton, 2204.6 pounds
1 cubic centimetre (cm³) = 1000mm³	= 0.6102 cubic inches
1 cubic metre (m³)	= 35.3 cubic feet, 1.3 cubic yards
1 litre (l)	= 0.220 imperial gallons, 0.264 US gallons
1 kilopascal (kP)	= 0.145 lbs/sq. inch, 0.009867 atmospheres
1 kilojoule (kJ)	= 0.948 BTU, 0.239 kilocalories, 737.56ft/lb
1 kilowatt (kW)	= 1.34 horsepower, 73.7ft.lb/sec
1 Newton (N)	= 0.2248lb force
1 Tesla (T)	= 10,000 gauss
1 Weber (W)	= 10⁸ Maxwell

Prefixes for Multiples and Sub-multiples of Quantities

Multiple or Sub-multiple	Name	Prefix
10 <sup>12</sup>	Tera	T
10 <sup>9</sup>	Giga-	G
10 <sup>6</sup>	Mega-	M
10 <sup>3</sup>	Kilo-	k
10 <sup>2</sup>	Hecto	h
10	Deca	da
10 <sup>-1</sup>	Deci	d
10 <sup>-2</sup>	Centi-	c
10 <sup>-3</sup>	Milli-	m
10 <sup>-6</sup>	Micro-	µ
10 <sup>-9</sup>	Nano-	n
10 <sup>-12</sup>	Pico-	p
10 <sup>-15</sup>	Femto	f
10 <sup>-18</sup>	Atto-	a

Preferred Number Series

(a) 10% Tolerance E12											
10	12	15	18	22	27	33	39	47	56	68	82
(b) 5% Tolerance E24											
10	11	12	13	15	16	18	20	22	24	27	30
33	36	39	43	47	51	56	62	68	75	82	91

DC resistance of conducting materials relative to copper

Material	Resistance Ratio	Material	Resistance Ratio
Aluminium	1.6	Nichrome	63.0
Brass	3.8	Nickel	4.1
Cadmium	4.1	Phosphor Bronze	6.7
Chromium	12.0	Platinum	6.4
Copper	1.0	Silver	0.97
Gold	1.4	Stainless Steel	43.0
Iron	5.9	Tin	6.6
Lead	12.0	Zinc	3.6

Useful Formulae

- Wavelength (in metres)  
Free space = 300/f(MHz)  
Half-wave wire dipole = 143/f(MHz)
- Resonant frequency of an LC circuit  
f = 0.159155/√(LC)
- The quality factor or Q of a circuit at resonance is  
Q = 2 πf L/r
- The 3 dB bandwidth of such a single tuned circuit  
B = f(res)/Q
- Estimate of transformer rating  
Output = 31 A² Watts  
where A = core cross-section in sq.ins.  
or Output = 4.8 A² Watts if A is in sq.cm.

Ohms Law

V = IR = W/I = √WR  
I = V/R = W/V = √W/R  
R = V/I = V²/W = W/I²  
W = VI = I² R = V²/R

Mains Plug Wiring

Phase	Brown	Red
Neutral	Blue	Black
Earth	Green/Yellow	Green

Average, Peak, RMS Values

Multiplication factor for sine wave				
	Average	RMS	Peak	Peak-Peak
Average	—	1.1133	1.573	3.143
RMS	0.933	—	1.414	2.828
Peak	0.637	0.7073	—	2.033
Peak-Peak	0.323	0.3535	0.533	—

Colour Codes

Tantalum Capacitors

Top/Middle band: Value in µF (2 digits)

Middle Spot: Multiplier

Bottom band: Maximum voltage

Colour	Value	Multiplier	Voltage
Black	0	×1	10.0
Brown	1	×10	1.6
Red	2	×100	0.4
Orange	3	×1k	40.0
Yellow	4	×10k	6.3
Green	5	×100k	16.0
Blue	6		20.0
Violet	7	×0.0001	
Grey	8	×0.01	25.0
White	9	×0.1	2.5

Capacitors

Top band: First digit of value

Second band: Second digit of value (gives value in pF)

Third band: Multiplier

Fourth band: Tolerance—White 10%, Black 20%

Bottom Band: Voltage

Resistors

Bands from closest to lead:

First digit of value

Second digit of value

Multiplier

Tolerance

Colour	Value	Multiplier	Tolerance
Black	0	×1	
Brown	1	×10	1%
Red	2	×100	2%
Orange	3	×1 k	
Yellow	4	×10 k	
Green	5	×100 k	
Blue	6	×1 M	
Violet	7	×10 M	
Grey	8		
White	9		
Gold			5%
Silver			10%
No band			20%

Notes

- 1% tolerance resistors have five bands. The first three give three digits of value, the rest as above.
- Bands are closer to one end of the resistor. Read bands in sequence from this end.



## Hexadecimal Constants

Hex Code	Most Significant Bytes		Least Significant Bytes	
0	0	0	0	0
1	4096	256	16	1
2	8192	512	32	2
3	12288	768	48	3
4	16384	1024	64	4
5	20480	1280	80	5
6	24567	1536	96	6
7	28672	1792	112	7
8	32768	2048	128	8
9	36864	2304	144	9
A	40960	2560	160	10
B	45056	2816	176	11
C	49152	3072	192	12
D	53348	3328	208	13
E	57344	3584	224	14
F	61440	3840	240	15

### HEX TO DECIMAL CONVERSION

Decimal Value = IV + III + II + I

## ASCII Character Codes as defined in ANSI X3.4

Dec	Hex	Char	Dec	Hex	Char	Dec	Hex	Char	Dec	Hex	Char
0	0	NUL	32	20	SPACE	64	40	@	96	60	—
1	1	SOH	33	21	!	65	41	A	97	61	a
2	2	STX	34	22	"	66	42	B	98	62	b
3	3	ETX	35	23	#	67	43	C	99	63	c
4	4	EOT	36	24	\$	68	44	D	100	64	d
5	5	ENQ	37	25	%	69	45	E	101	65	e
6	6	ACK	38	26	&	70	46	F	102	66	f
7	7	BEL	39	27	'	71	47	G	103	67	g
8	8	BS	40	28	(	72	48	H	104	68	h
9	9	HT	41	29	)	73	49	I	105	69	i
10	A	LF	42	2A	*	74	4A	J	106	6A	j
11	B	VT	43	2B	+	75	4B	K	107	6B	k
12	C	FF	44	2C	,	76	4C	L	108	6C	l
13	D	CR	45	2D	-	77	4D	M	109	6D	m
14	E	SO	46	2E	.	78	4E	N	110	6E	n
15	F	SI	47	2F	/	79	4F	O	111	6F	o
16	10	DLE	48	30	0	80	50	P	112	70	p
17	11	DC1	49	31	1	81	51	Q	113	71	q
18	12	DC2	50	32	2	82	52	R	114	72	r
19	13	DC3	51	33	3	83	53	S	115	73	s
20	14	DC4	52	34	4	84	54	T	116	74	t
21	15	NAK	53	35	5	85	55	U	117	75	u
22	16	SYN	54	36	6	86	56	V	118	76	v
23	17	ETB	55	37	7	87	57	W	119	77	w
24	18	CAN	56	38	8	88	58	X	120	78	x
25	19	EM	57	39	9	89	59	Y	121	79	y
26	1A	SUB	58	3A	:	90	5A	Z	122	7A	z
27	1B	ESC	59	3B	;	91	5B	[	123	7B	{
28	1C	FS	60	3C	<	92	5C	\	124	7C	
29	1D	GS	61	3D	=	93	5D	]	125	7D	}
30	1E	RS	62	3E	>	94	5E	→	126	7E	~
31	1F	US	63	3F	?	95	5F	_	127	7F	DEL

## ASCII Control Codes

NUL (Ctrl @) Null	DLE (Ctrl P) Data Link Escape
SOH (Ctrl A) Start of Heading	DC1 (Ctrl Q) Device Control 1
STX (Ctrl B) Start of Text	DC2 (Ctrl R) Device Control 2
ETX (Ctrl C) End of Text	DC3 (Ctrl S) Device Control 3
EOT (Ctrl D) End of Transmission	DC4 (Ctrl T) Device Control 4
ENQ (Ctrl E) Enquiry	NAK (Ctrl U) Negative Acknowledge
ACK (Ctrl F) Acknowledge	SYN (Ctrl V) Synchronous Idle
BEL (Ctrl G) Bell	ETB (Ctrl W) End of Transmission Block
BS (Ctrl H) Back Space	CAN (Ctrl X) Cancel
HT (Ctrl I) Horizontal Tab	EM (Ctrl Y) End of Medium
LF (Ctrl j) Line Feed	SUB (Ctrl Z) Substitute
VT (Ctrl K) Vertical Tab	ESC (Ctrl j) Escape
FF (Ctrl L) Form Feed	FS (Ctrl \) File Separator
CR (Ctrl M) Carriage Return	GS (Ctrl j) Group Separator
SO (Ctrl N) Shift Our	RS (Ctrl ^) Record Separator
SI (Ctrl O) Shift In	US (Ctrl _) Unit Separator

## The RS-232C Interface

The basic RS-232C Electrical specifications

### Communication rate:

0–20,000 bits per second

### Driver output voltage levels, maximum no load:

–25 V logic 1, +25 V logic 0

### Driver output voltage ranges for loads between 3 k and 7 k Ohms:

Logic 1: –15 V (7 k) and –5 V (3 k)

Logic 0: +15 V (7 k) and +5 V (3 k)

### Driver output current, short circuit:

500 mA maximum

### Driver output impedance with power off:

300 Ω minimum

### Maximum driver output slew rate:

30 V per microsecond

### Receiver input resistance:

7 k Ω maximum

3 k Ω minimum

### Effective receiver input capacitance:

2500 pF maximum

### Maximum receiver input voltage range:

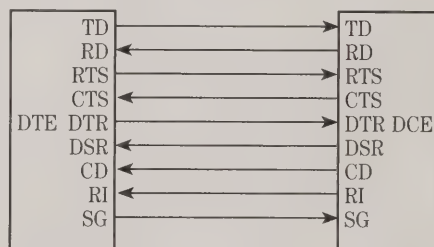
–25 V to +25 V

The following table shows the nine most common signals used for serial communications and their PIN allocations for nine and 25 PIN connectors:

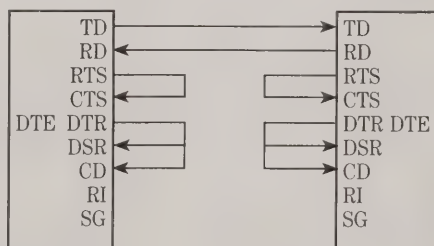
Signal	PIN No. (9 pin)	PIN No. (25 pin)
TD	3	2
RD	2	3
RTS	7	4
CTS	8	5
DSR	6	6
SG	5	7
CD	1	8
DTR	4	20
RI	9	22

### Common RS-232C Connections

Each signal (except ground) is either an input or an output depending whether it is on the Data Terminal Equipment (DTE) (eg, a computer terminal) or the Data Circuit Terminating Equipment (DCE) (eg, a modem). A typical connection is shown below.



When two computer terminals (DTEs) are connected together, a "null modem" hook-up is needed to fool each DTE into thinking that it is connected to DCE. A typical null modem connection is shown below.



# BASIC & DERIVED SI UNITS - CONVERSION FACTORS

## Basic SI Units

Quantity	Name of unit	Unit symbol
Electric current	ampere	A
Length	metre	m
Luminous intensity	candela	cd
Mass	kilogramme	kg
Thermodynamic temperature	degree Kelvin	°K
Time	second	s

## Derived SI Units

Physical quantity	SI unit	Unit symbol
Electric capacitance	farad	F = A s/V
Electrical charge	coulomb	C = A s
Electrical potential	volt	V = W/A
Electric resistance	Ohms	Ω = V/A
Force	Newton	N = kg m/s <sup>2</sup>
Frequency	Hertz*	Hz = s <sup>-1</sup>
Illumination	lux	lx = lm/m <sup>2</sup>
Inductance	Henry	H = V s/A
Luminous flux	lumen	lm = cd sr
Magnetic flux	Weber	Wb = V s
Magnetic flux density	Tesla†	T = Wb/m <sup>2</sup>
Power	Watt	W = J/s
Work energy, quantity of heat	joule	J = N m

\*Hertz is equivalent to cycle per second.

†Tesla is equivalent to Weber per square metre.

## Conversion factors

To convert	into	Multiply by	Conversely
Amp hours	Coulombs	3600	2.778 × 10 <sup>-4</sup>
Atmospheres	Lb/sq.in	14.70	0.068
Centigrade	Kelvin	°C + 273 = °K	°K - 273 = °C
Cubic inches	Cubic feet	5.787 × 10 <sup>-4</sup>	1728
Cubic inches	Cubic metres	1.639 × 10 <sup>-5</sup>	6.102 × 10 <sup>4</sup>
Degrees	Radians	1.754 × 10 <sup>-2</sup>	57.3
Dynes	Pounds	2.248 × 10 <sup>-6</sup>	4.448 × 10 <sup>5</sup>
Ergs	Foot pounds	7.376 × 10 <sup>-8</sup>	1.356 × 10 <sup>7</sup>
Feet	Centimetres	30.48	3.281 × 10 <sup>-2</sup>
Foot pounds	Kilowatt hours	3.766 × 10 <sup>-7</sup>	2.655 × 10 <sup>6</sup>
Gausses	Lines per sq.in.	6.452	0.155
Grams	Dynes	980.7	1.02 × 10 <sup>-3</sup>
Grams per cm	Pounds per in	5.6 × 10 <sup>-3</sup>	178.6
Horsepower	Kilowatts	0.746	1.341
Inches	Centimetres	2.54	0.3937
Kilograms	Pounds (lb)	2.205	0.454
Kilometres	Feet	3281	3.048 × 10 <sup>-4</sup>
Kilometres	Nautical miles	0.540	1.853
Kilometres	Statute miles	0.621	1.609
Kilowatt hours	Joules	3.6 × 10 <sup>6</sup>	2.778 × 10 <sup>-7</sup>
Kilowatt hours	HP hours	1.341	0.7457
Knots	Miles per hour	1.1508	0.869
Lamberts	Candles per sq.cm	0.3183	3.142
Lamberts	Candles per sq.in	2.054	0.4869
Lumens per sq.ft	Foot candles	1	1
Lux	Foot candles	0.092892	10.764
Metres	Feet	3.28	10.764
Metres	Yards	1.094	0.9144
Miles per hour	Feet per second	1.467	0.68182
Nepers	Decibels	8.686	0.1151
Tons	Pounds	2240	4.464 × 10 <sup>-4</sup>
Watts	Ergs per second	10 <sup>7</sup>	10 <sup>-7</sup>

# OLD TIMERS CLUB

The objects of the Old Timers' Club (ZL) are set out in our Constitution adopted in 1993.

They are as follows:

1. To recognise service to Amateur Radio;
2. To revive and maintain interests and good fellowship among the older members in the common cause.
3. To offer advice and encouragement to newer Amateurs.

The Club is affiliated to the New Zealand Association of Radio Transmitters (Inc).

The Annual General Meeting is held on the Sunday morning of Queen's Birthday weekend (in conjunction with the NZART Conference).

**Grand Old Man:** Ivan Horn, ZL2ATU

**Secretary/ Treasurer:** Barry Stewart, ZL2RR

**Postal Address:** OTC, 1 Caversham Road, Westmere,

Wanganui 4501

Phone: 06-345 4152

E-mail: <ZL2RR@extra.co.nz>

**Net Controllers:**

Roy Symon ZL2KH

Don Dalrymple ZL3SZ

Stuart Watchman ZL2TW

Pete Moore ZL2AUB

Ivan Horn ZL2ATU

AM Net Controller:

Doug Alexander ZL2AWF

**District Representatives:**

ZL1: Stephen Miller, ZL1FS

ZL2: Stuart Watchman, ZL2TW

ZL3: Don Dalrymple, ZL3SZ

ZL4: Peter Anderson, ZL1LR

**OTC Scribe:** Any material for the Break-In page should be sent to:

Stephen Hayman, ZL1TPH, <zlltph@nzart.org.nz> or Call -book address.

A National Single Side-band Net is held every Monday evening at 2030 hrs (local time). The callsign is ZL6OTC. The frequency is 3.870 MHz. An AM Net is also run on

Sunday morning at 10.30 am on 3.850 MHz. The Secretary gives the Club News during the SSB Net.

Full membership is available to any holder of a ZL callsign who has held an amateur licence for the last 25 years or more and is still an active amateur.

In addition, Associate Membership is available to any ZL amateur who has attained the age of 60 years (and over) and has been an active amateur for 10 or more years. Voting privileges are not available to Associate Members.

Application Forms for membership may be obtained from a District Representative, from the National Secretary, or can be downloaded from the NZART web page: <www.nzart.org.nz> A joining fee of \$10.00 is payable on application.

Evidence of eligibility which is to be submitted shall include, full

name, present callsign, original call, operator's certificate number and date of original licence. All applications for membership shall be proposed and seconded by present OTC members.

On acceptance, a Certificate is issued to all Full and Associate Members, and they will be listed in the **Blue Book**.

All members of OTC are eligible to wear the Peacock Blue NZART Badge with callsign so long as they are financial members of NZART. This badge is available from NZART HQ at the current price of the similar black membership badges.

Handsome certificates are sent automatically to those who attain 50, 60 and 70 years of Amateur Service.

Articles relating to all aspects of OTC or of vintage radio for publication in the OTC section of **Break-In** are welcomed.



JOTA is an annual event in which about 500,000 Scouts and Guides in countries all over the world make contact with each other by means of amateur radio. It is a real Jamboree during which Scouting and Guiding experiences are exchanged and ideas are shared, thus enhancing worldwide Scouting and Guiding. JOTA has been held annually since 1958 and Scouts and Guides are encouraged each year to invite radio amateurs to help them take part.

There are great potential benefits to amateur radio by encouraging young people to take part in JOTA as it introduces them to the hobby that you as an amateur enjoy. So it is in the interests of New Zealand amateurs to anticipate invitations by Scouts and Guides and also to approach their leaders, offering services and equipment.

The easiest way for Scouts and Guides to take part in JOTA is for them to visit an amateur station sometime during the JOTA period. At the station, the amateur establishes a contact with another amateur station and then hands over the microphone to the



Scouts and/or Guides. Satellite, Packet, SSTV and other modes of communication (including e-mail) are now used for JOTA as well as the normal modes using HF and VHF/UHF.

Many stations are set up at Scout or Guide Headquarters or at some

local "interesting" or appropriate venue. Often, JOTA stations are set up at camps, the radio activities being incorporated into the camping programme.

JOTA is now run concurrently with the Jamboree on the Internet (JOTI), the JOTA and JOTI

stations being often combined on the same site. There is much information about JOTA and JOTI on the New Zealand Scouting web pages: <[www.scouts.org.nz](http://www.scouts.org.nz)>, on the world scout JOTA web pages: <[www.scout.org/jota](http://www.scout.org/jota)> and <[www.scout.org/joti](http://www.scout.org/joti)>. Also on <[www.jimparnell.co.nz/jota/jota.html](http://www.jimparnell.co.nz/jota/jota.html)> and <[www.jimparnell.co.nz/joti/joti.html](http://www.jimparnell.co.nz/joti/joti.html)>.

JOTA and JOTI are both co-ordinated by the World Scout Bureau and organised by National Organisers in each Scouting and Guiding country.

JOTA and JOTI are always held during the 48 hours (local time) of the third full weekend in October. Sometimes this weekend is followed by Labour Day (4th Monday in October) and sometimes not.

In the year 2012, JOTA will be held on October 20 and 21. This is the Labour Day Weekend and some stations may continue to operate on the Monday.

Jim Parnell, ZL2APE/ZL2V.

E-mail: [jim-p@ihug.co.nz](mailto:jim-p@ihug.co.nz)

National Organiser for JOTA and JOTI in New Zealand.

## FISTS DOWN UNDER

### New Zealand and Australia

FISTS Down Under is the New Zealand and Australian chapter of the FISTS Club, (International Morse Preservation Society) is one where veteran operators help newcomers and less-experienced operators learn and improve CW proficiency. The membership has grown from 300 in its first year of operation to over 5,550 members worldwide. It is one of amateur radio's fastest growing amateur radio organisations.

FISTS Down Under was formed in 1998 with Ralph Sutton ZL2AOH as the New Zealand/Australian coordinator. Membership now stands at over 150.

### FISTS supports the use of Morse code

The membership comprises existing and prospective Morse operators and others who support our aims, including short-wave listeners.

We have three straightforward goals:

- Further the use of CW
- Engender friendships among members
- Encourage newcomers to use CW

Brought together by a common love of Morse, FISTS members actively participate in a wide variety of amateur radio activities including nets, rag chewing, earning awards, QRP, contesting and of course "Elmering." All activities include both slow and higher speeds and emphasise courteous operating practices.

### FISTS Club membership

FISTS members are young, old, both OMs and YLs—they live all over the world including every State in the USA and all enjoy CW communications at widely varying proficiency levels.

FISTS is not tied to any commercial interests and has no paid employees. VK and ZL members receive "FISTS Down Under, our local monthly newsletter, as well as the UK produced newsletter Key Note and "MorseAsia" the newsletter of the East Asia" chapter. All activities are funded from annual fees of \$15.00 (spouses and dependants of existing members can join at no cost).

Requirements for membership of the FISTS Club are very simple. One simply has to like Morse

code! You do not need to be a member of any other organisation and there is no minimum Morse proficiency requirement. You don't even have to be a licensed amateur.

### FISTS QSL Bureaus

FISTS operates bureaus in the USA, UK, East Asia and Australia for the quick exchange of QSL cards between members. This is a no-cost service to members.

### FISTS contests

FISTS occasionally conducts contests for members and others

### FISTS awards

FISTS members participate between themselves in a popular award scheme that includes the following:

- Century award is for 100 FISTS contact points
- Platinum Award is for 100 Century Award contacts
- 250 Century award is for 250 Century Award holder contacts
- 500 Century Award is for 500 Century Award holder

contacts

- Silver Award is for 250 FISTS contact points
- Gold Award is for 500 FISTS contact points
- Diamond Award is for 1000 FISTS contact points

Worked FISTS all US States—for exchange between FISTS members in QRP as well as QRO categories and more!

### Affiliation

FISTS Down Under is affiliated to WIA (Wireless Institute of Australia) and NZART (New Zealand Association of Radio Transmitters.)

### Membership and other inquiries

Ralph Sutton ZL2AOH  
12c Herbert Gardens  
186 The Terrace  
Wellington 6011

Telephone: (04) 473-0847

Fax: (04) 473-0848

E-mail: <[fists-downunder@ihug.co.nz](mailto:fists-downunder@ihug.co.nz)>

Web: <<http://www.fistsdownunder.org>>

# AMATEUR RADIO DIRECTION FINDING

## What is ARDF?

Amateur Radio Direction Finding (ARDF), colloquially called "Fox Hunting", is a sport resembling Orienteering, but in addition to using compass and map reading skills, competitors need to use radio directional finding skills to find the transmitters.

An ARDF competition would normally be set in a park or rural area, preferably having sparsely tree-covered valleys. Within this area, five transmitters would have been placed and now have to be found by the competitors whom the starter issues with a topographical map and releases them individually at five minute intervals to avoid "following". A sixth transmitter is usually provided at the finish line to help competitors find their way home. The rules used throughout the world, with minor variations, are maintained by the IARU ARDF Working Group. There may be several classes of competitor, based on age. Not all classes are required to find all the transmitters. Contestants are free to find the transmitters in any order they wish, thus taking advantage of any tracks that are shown on the map (figure 1).

A time limit is set by the organiser who takes into account the terrain and the length of the course. The rules recommend that it should be 60 – 90 minutes for a 4 km course.

Competitors who are late back would have points deducted, or who do not finish within two hours would be disqualified.

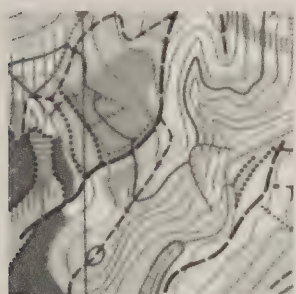


Figure 1.

Separate events are held for the 80m and 2m bands. Each transmitter will be keying a unique identification Morse code, viz: MOE, MOI, MOS, MOH, and MO5. On VHF this will be MCW. The five transmitters operate on a common frequency, each taking a turn to operate for one minute and then be silent for four minutes, during which time the other four transmitters will

operate in turn.

The transmitters are not really "hidden". Beside each is an orange and white prism shaped control flag (figure 2) on which is mounted a "unique pattern punch" that the competitor impresses on his time card to prove afterwards that he has visited it.



Figure 2.

The winners of each class in the event are the competitors who find the most number of transmitters in the shortest elapsed time.

## What is needed to participate?

It is possible to use a simple handheld rig. Any form of directional aerial can be used for ARDF. Additionally an attenuator and a method of accurately determining signal strength would be useful. As the level of competition becomes keener, your equipment needs to become more refined. For example, use Google to find construction details of circuits that use phased antenna arrays.

Auckland VHF Group<sup>1</sup> are custodians of five NZART owned transmitters using 144.700 MHz and some AM receivers mounted on a 2 element Yagi array. These are loaned to neighbouring Branches and to JOTA for their events.

Auckland Branch has programmed arduino keyers for homebuilt transmitters using 80m. Their transmitters differ from the foregoing description in that the five transmitters send their codes continuously on 3.51, 3.52, 3.53, 3.54, and 3.55 MHz respectively. Finding these transmitters is much easier because signals are not deflected as experienced at 2m. Their receivers were built from kitsets<sup>2</sup> that use a ferrite rod and have been reviewed as a low cost, excellent entry level receiver.



Figure 3.

## Brief history:

Post WWII, Amateur radio was widely promoted in the schools of Northern and Eastern Europe as a modern scientific and technical activity. ARDF as a sport originated in Northern Europe where the sport of orienteering was popular in its native Scandinavia. International championships were held in Europe in the 1960s and in the late 1970s until there was a need for more clearly defined and consistent rules for international competitions. This led to the formation of an ARDF working group by the International Amateur Radio Union (IARU).

The first ARDF event to use the new standardized rules was the 1980 World Championship held in Cetniewo, Poland, where competitors from eleven European and Asian countries participated. These rules have been revised and updated over the years, increasing the number of gender and age categories into which competitors are classified, as well as formalizing the start and finish line procedures. While some variations exist, these standardized rules have since been used worldwide for ARDF competitions, and the IARU has become the principal international organization promoting the sport. The IARU divides the world into three regions for administrative purposes (figure 3).

Last year Region III held its Championships near Melbourne, attended by 100 competitors. This year's 2012 World Championship is to be held in Serbia in September, where each country may send up to three competitors in each of eleven age categories, six for males and five for females, in accordance with rules.

ARDF is a sport that now spans much of the globe. In UK one can attend an event every weekend

within easy driving distance. In Melbourne an event is set every month.

## Inter-Branch Competitions

Over these last two years, Auckland Branch has convened Inter-Branch Competitions. Other clubs have been heard to say that they are planning to take their turn. It is an opportunity to enjoy fellowship with like-minded Amateurs in this fun-filled sport. ARDF has a lot to offer - it is a challenging outdoor skill activity for everyone. After participating there is much satisfaction to be had by sharing with others your experiences about how you found the transmitters, your route choices and your strategy. Making good decisions and always knowing where you are, and where you want to go, are important skills that ARDF teaches. It is addictive; just like after playing a round of golf, you say to yourself as you go home: "I shall do better next time."

Hunting for foxes in the forest is a great way to involve youth (figure 4) in a fun outdoor activity that involves the science and technology of Amateur Radio and an avenue for recruiting them into our hobby.



## References

1. Auckland VHF Group, Box 10-138, Dominion Road, Auckland, 1030.
2. For a revue of this product visit <http://www.open-circuit.co.uk/pj80.php>  
Order from Beijing Sinolyn Toyotechno Corporation,  
E-mail: [ca\\_license@ybb.ne.jp](mailto:ca_license@ybb.ne.jp)



## What is the NZART Radioscience Education Trust?

The Trust is a fund from which money will be made available for charitable purposes and the objectives of the Trust are set out in a Deed of Trust. It is structured to operate as a charitable trust to maximise the benefits to the recipients. It is governed by three Trustees who are responsible for all aspects of the Trust's operation.

## What are the Trust's objectives?

The objectives for which the Trust has been established are to apply the Trust's assets within New Zealand to promote and encourage education in radioscience, whether by payment of course fees for worthy candidates, the provision of prizes for excellence in educational activities, grants-in-aid, or otherwise as the Trustees think fit. Beneficiaries do not have to be members of NZART, nor will members receive preference.

## How does the Trust work?

Currently the Trust provides prizes and awards for students offering a project or exhibit having a radioscience theme at area Science and Technology Fairs. Organising this activity involves NZART members at national and Branch level throughout the country. The Trust also offers "Grants-in-Aid" to schools to assist in the development of Science Fair projects and also to organisers of similar promotional activities such as "Buildathons", "RadioTek" events, etc. More recently the Trust has provided support for University postgraduate projects.

## Where does NZART fit into this Trust?

The Deed of Trust specifically sets the Association aside from any involvement. In effect, the Trust will be transparent to the Association since the awards, their control, and the financial aspects

of the Trust are totally under the control of the Trustees.

## How will the Trust's finances grow?

The Trust operates from the income generated by the capital invested and the accrued interest is used to finance the awards and prizes etc. Apart from the foundation donation, other significant capital has come from anonymous donors and surpluses from NZART conferences.

The Trustees welcome inquiries from any person or organisation wishing to support the Trust by donation; replies will be treated in the strictest confidence. The Trustees intend that the fund should grow at least in line with inflation to ensure benefits are not eroded. The Trust has Charitable status. Briefly, this means that the Trust's income is not taxable and that in most cases donations to the Trust are tax-deductible.

## Who are the Trustees and how are they appointed?

The four Trustees are all NZART members of long standing who hold the Association, its aims and objectives at the highest level. The present Trustees are:

*Terry Carrell* ZL3QL, Christchurch. Life Member, Past-President, and ex-IARU Liaison Officer.

*Peter Norden* ZL2SJ, Featherston; a former President of NZART.

*John Walker* ZL3IB, Christchurch. Editor *Break-In*

*Grahame Fraser* ZL3SJ Christchurch; Associate Editor *Break-In*

The President of NZART, in consultation with the Vice-President, will appoint the Trustees as and when necessary.

## The Science and Technology Fair Organisation

Nationally, the Science and Technology Fair scheme is sponsored by a number of

organisations and, at present, there are 22 regional Science and Technology Fairs whose winners go on to take part in the National Science and Technology Fair. More information on these may be found on the Royal Society's web page <[www.rsnz.govt.nz](http://www.rsnz.govt.nz)>

## What are the prizes for?

The aims of the Trust are broad. The Trustees wish to support and encourage all and any aspect of radioscience. Relevance to amateur radio is a plus but not a prerequisite. For the time being the Trust sponsors a prize to the value of \$100 at each of the local area Science and Technology Fairs. Local NZART Branches are asked to provide judges and other forms of support for these events. Prizes will only be awarded where the judges consider there is a worthy recipient.

Starting in 2007 the Trust offered limited "Grants-in-aid" to support suitable radioscience projects in schools and other promotional activities such as "Buildathons" and "RadioTek" events. In 2011 the Trust supported several KiwiSAT research projects at the Albany campus of Massey University.

It is hoped that in the long term this two-way exchange will generate interest in radio and electronics leading to more young radio amateurs. At the same time it provides Branches with a means of local involvement and recruitment. Full details and grant application forms appear in *Break-In* and are on the Trust's web page <[www.nzart.org.nz/nz/trust.html](http://www.nzart.org.nz/nz/trust.html)>

## Looking ahead: let's talk about the Trusts, bequests and your will

By supporting the Trust you can partake in the development of new and exciting communications technology that is rapidly adding more options for a career, education, international understanding, and a wonderful

pastime. You can help preserve this experience and pass it on to a new generation of New Zealanders by contributing to the Trust. You can be part of the future now!

It's quite natural to wonder about the future. Potential contributors may ask in what way they can support the NZART Education Trust throughout a lifetime or beyond. You may have had in your amateur radio activity an experience that has enriched your life, or seen or heard of something special that you wish to help perpetuate. Perhaps the Amateur Service with its many facets of activity, and public service, has made a lasting difference to your life, education and career.

A practical way to ensure future interest in Amateur Radio is by making a bequest to the Trust. The legally binding obligations on the Trust, as set out in its Deed of Trust, ensure that your donation will be preserved and used exclusively for the purpose intended, the promotion and encouragement of education in radioscience. We recommend strongly that a solicitor provide assistance when you are considering a bequest, or any modification to your will, as the law must be considered when executing a bequest. Your solicitor can assist you to tailor your will to your precise needs.

The NZART Radioscience Education Trust is a Charitable Trust founded by NZART Inc to promote and encourage education in radioscience. The Trust's income is tax-free and donations to the Trust are tax-deductible to the extent permitted by the Income Tax Act 1994.

Correspondence regarding the Trust, grant applications and contributions should be addressed to: The Trustees, NZART Radioscience Education Trust, PO Box 1733, Christchurch 8140. Information about the Trust is also available on the NZART web site <<http://www.nzart.org.nz/nzart/nzart/trustweb.html>>.



## Hands on – to RADIO WAVES

Coordinator: Fred Johnson MNZM ZL2AMJ

With support from: The NZART Radioscience Education Trust

The aims of this project:

- To promote an interest in the science and technology of wireless communications in young people.
- To encourage members of the teaching profession to use amateur radio in school to further their teaching of science and technology.
- To provide education and training for educators in the science and technology of wireless communications.

For further Information: <http://www.nzart.org.nz/waves/radiowaves.html>

## Application for a Grant-in-Aid

Applications are invited from secondary school science teachers and other training providers for Grants-in-Aid from the NZART Radioscience Education Trust to promote the development of projects in the general areas of radio and/or electronics. It is anticipated that these projects will lead to entries in the local area Science & Technology Fair. Grants will not normally exceed \$250.00.

Applications should normally be received no later than 30 April of the year of application. Application forms maybe obtained from; The Trustees, NZART Radioscience Education Trust, PO Box 1733, Christchurch 8140, or from <trustee@nzart.org.nz>. Applications should be endorsed by the Head of Science or, for other organisations, the President/Chairerson.

## Application for a Grant-in-Aid

(Please type or print)

Name of Applicant \_\_\_\_\_ Date \_\_\_\_\_

Name of School/Organisation \_\_\_\_\_

Postal address \_\_\_\_\_

Phone ( ) \_\_\_\_\_ Email \_\_\_\_\_

Brief description of project(s) \_\_\_\_\_

Purpose for which grant is requested (eg purchase of equipment, etc) \_\_\_\_\_

Item(s) requested and cost; \_\_\_\_\_

At the conclusion of the project materials and/or equipment purchased with this grant shall remain the property of the school/organisation.

I agree to the above conditions and declare that the information given above is correct.

Signed \_\_\_\_\_ HoD Science / Chairperson

Please send this application form to The Trustees, NZART Radioscience Education Trust , PO Box 1733, Christchurch 8140.



*Secretary/Treasurer:*

Steve Miller, ZLIFS  
Unit 2, 329 Kohimarama Rd  
St. Heliers  
Auckland 1071  
Email: [delica@slingshot.co.nz](mailto:delica@slingshot.co.nz)  
Cell Ph: (021-022 64 981)

*Break In scribe:*

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Mobile: (027) 552-2221  
E-mail: [b\\_olsen@xtra.co.nz](mailto:b_olsen@xtra.co.nz)

*Librarian and Archivist:*

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Hamilton 3214  
Phone: (07) 855-5435  
E-mail: [john.n@orcon.net.nz](mailto:john.n@orcon.net.nz)

**Meetings**

The Annual General Meeting is held annually at Queen's Birthday Weekend in conjunction with the NZART Conference.

**Aims and Objects**

To preserve Amplitude Modulation as a means of Amateur Radio communication.

**General**

In order to keep expenses to a minimum, membership lists, financial statements, information, etc., sought by members will be sent on receipt of a stamped and addressed envelope. The information sought will be sent as soon as possible.

**Nets**

There are nets operating at present on AM on 3.850 MHz at the following times:  
Friday evenings at 2000 hours (Northern area based).  
Those interested are urged to call "CQ AM" on 3.850 MHz AM any evening at 2000 hrs local time if they want a QSO.

**Subscription**

\$5.00, payable once only on joining. A collection will be taken up each year at the Annual General Meeting, and donations will always be acceptable.

**Bulletins**

Bulletins are sent out regularly by e-mail to those who have provided their e-mail addresses. These are sent by the "blind copy" method so individual's addresses are not circulated to everyone. The bulletins include news, requests for information, parts and equipment available, parts or equipment wanted, plus anything else that might be of interest to members.

**Call-sign ZL6YL****Object**

To promote and encourage interest in Amateur Radio amongst women.

WARO was formed in 1961-62 by a small but keen group of YL transmitters and has steadily grown both in numbers and enthusiasm.

For the annual subscription (currently \$15.00 (decreasing to \$10.00 if paid at the end of August) for New Zealand members) members receive four quarterly Bulletins containing items of interest to operators and friends, with special attention to YL activities.

**Associate members** — YLs who do not have a transmitting licence are welcome, as are YLs from overseas, many of whom are sponsored by ZL members.

**Friends of WARO** — persons who support WARO may become Friends of WARO by making a donation of not less than the current subscription.

The **Thelma Souper Memorial Contest** is held annually in early April in honour of our founder. It is open to YLs and OMs and is held on the lower end of the 80 m band.

The **WARO Achievement Award** may be awarded annually to persons nominated by their peers for outstanding achievements in any aspect of Amateur Radio. Nominations close at the end of March each year and the Award is presented at the AGM in June.

The form this takes is the Myrtle Earland Memorial Rosebowl in honour of New Zealand's first licensed YL.

WARO also operates several awards including the WARO Award and the Mountain Buttercup Award. For further details on these see the Awards section elsewhere in this Call Book.

**Elected Officers***President*

Margaret Bretherton ZL1MB  
<[tedmarg@clear.net.nz](mailto:tedmarg@clear.net.nz)>

*Vice-President*

Cathy Purdie ZL2ADK  
<[cathpurdie@inspire.net](mailto:cathpurdie@inspire.net)>

*Secretary*

Lynnette McDonald ZL1LL  
<[lynnette.mcdonald@xtra.co.nz](mailto:lynnette.mcdonald@xtra.co.nz)>

*Treasurer and Membership**Applications*

Heather Scott ZL2TYF  
<[secretary@nelsoncarclub.co.nz](mailto:secretary@nelsoncarclub.co.nz)>

*Immediate Past President*

Lynnette McDonald ZL1LL  
<[lynnette.mcdonald@xtra.co.nz](mailto:lynnette.mcdonald@xtra.co.nz)>

*Executives*

Bev Gillman ZL3OV  
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Marlene Mathews ZL1MYL  
<[perma@xtra.co.nz](mailto:perma@xtra.co.nz)>

*Awards Manager*

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*Contest Manager*

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Celia Reed ZL1ALK  
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*Librarian/Archivist*

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*Bulletin Editor*

Bev Osborne ZL1OS  
<[zlllos@slingshot.co.nz](mailto:zlllos@slingshot.co.nz)>

**YL Nets**

WARO VHF Auckland  
Sunday 7 pm NZ time 146.625 MHz (Klondyke)  
WARO HF WARO  
Mondays 8pm NZ time  
3.695MHz ±.  
WARO Executive  
Second Sunday 0800 UTC  
3.695MHz ±.  
NAGS VHF Nelson  
Wednesday 7.30 pm  
47.025  
International ALARA  
Mondays 1030 UTC 3.580

**DX sponsorship**

It is great to sponsor a YL from another YL organisation — increases your awareness of other countries and their people. We have DX sponsored members from all over the world and it does help to forge greater bonds between all of us. To sponsor a YL contact the Sponsorship

Secretary for further information and contacts. It costs the value of a DX membership subscription and gives the chance to exchange news and views with each other.

**YL Get-Togethers**

These are held regularly throughout the country as well as the annual Get-Together at the time of our AGM in June. Consider going along to these affairs — they are a lot of fun.

**WARO Bulletin/Break-In page**

Copy is always required for these publications and any news/ views of/by or from members are very welcome by the two editors concerned. Photographs are especially welcome — how about sending some in NOW. Enquiries are always welcome from any YL for membership/ fellowship in all of our activities. Feel free to contact any of the above-mentioned YLs or any other member of WARO. And always be on the lookout for ZL6YL — our own call-sign.

**WARO on the Internet**

<[www.qsl.net/zl6yl](http://www.qsl.net/zl6yl)> or <[www.nzart.org.nz](http://www.nzart.org.nz)>. Visit the WARO website where you will find past issues of the WARO Bulletin and WARO news. There is also a comprehensive history of WARO, and links to DX YL amateur radio organisations.

# ROTARIANS OF AMATEUR RADIO

The opportunity to combine the enjoyment of amateur radio and Rotary membership established the international fellowship of Rotarians of Amateur Radio (ROAR). In 1905 four Chicago businessmen founded a local service group that by 1925 had grown to over 100,000 worldwide members in 2000 clubs and became known as Rotary International. Today there are 1.2 million members in 32,000 clubs throughout 200 countries.

The objective of Rotary International is service to local and international communities, examples of which include the eradication of polio, improvement of water supplies, scholarships and international exchanges. Needless to say, the survival of any group depends on its members enjoying what they do. Many Rotarians enjoy extending their fellowship with others who share similar pursuits and this has led to the formation of about 60 international fellowships, one of which is ROAR.

The purpose of ROAR is to provide a forum for the exchange of views between its members who share an



interest in Amateur Radio, either as licenced Radio Amateurs or as Short Wave Listeners with a view to developing understanding, acquaintance and fellowship. Members of ROAR must

be Rotarians, Rotaractors or retired Rotarians or the Spouses of Members who hold a licence issued in their own country of residence, or who have a genuine interest in shortwave radio.

Current international membership stands at about 300 and their primary means of fellowship is via national and international networks on 80m, 40m and 20m. Membership fees are modest and contribute to the support of a website ([www.lfroar.org](http://www.lfroar.org)) and communications. New Zealand is part of ROAR's Australia-NZ-Oceania (ANZO) region.

The ANZO network operates on 7118 each Sunday and is followed by the ANZO-Europe net on 14293. The nominal times for these nets are: ANZO at 0545z (winter) and 0645 (summer); ANZO-Europe at 0630z (winter) and 0730z (summer). A ZL net has recently been re-kindled and operates on 3693 each Tuesday at 0800z. Times may vary as propagation changes so those wishing to join one of these Nets are invited to check the website for the latest information.

New members are most welcome and further information is available from Dr John Moriarty (ZL2JPM) at [john@moriarty.biz](mailto:john@moriarty.biz) or the ROAR website.

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# Call triple 111 (111) in an emergency

Ask for an ambulance, stay with the injured person and resuscitate



## 1 CHECK FOR DANGER

Ensure safety for yourself, bystanders and casualty. If safe, remove casualty from water as soon as possible.



## 2 CHECK RESPONSE

Can you hear me?  
Open your eyes.  
What's your name?  
Squeeze my hand.



## 3 CLEAR AIRWAY

If water or vomit is present in mouth, roll casualty on side, tilt face downwards and clear mouth with your finger.



## 4 CALL TRIPLE ZERO (000)

Ask for an ambulance. Remain calm while answering the questions. Stay on phone until you are told to hang up.



## 5 CHECK FOR NORMAL BREATHING

**Look** and feel for rising and falling chest.  
**Listen** and feel for breath sounds.



## 6 PREPARE RESUSCITATION

**Adults and Children** – tilt head backward. Place one hand on the forehead and use the other hand to lift the chin.

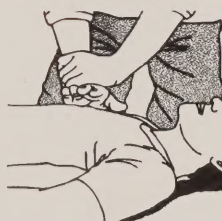
**Infants < 1 year** – do not tilt head. Place one hand on the forehead and use the other hand to support the chin.



## 7 START BREATHS

**Adults and Children** – Seal nose and give 2 breaths into mouth.

**Infants < 1 year** – Give 2 breaths into mouth and nose. Watch for chest to rise.



## 8 START COMPRESSIONS

**Adult** – place heel of hand in centre of chest. Place other hand on top of first.

**Children 1-8 years** – place heel of hand in centre of chest.

**Infants < 1 year** – Place 2 fingers in centre of chest. Compress 1/3 depth of chest. Compress 30 times.



## 9 REPEAT BREATHS & COMPRESSIONS

Repeat 2 breaths and 30 chest compressions. Continue until ambulance arrives or person regains consciousness or it becomes impossible for you to continue.



## 10 RECOVERY

If injured person shows signs of recovery, roll onto side and check if they are breathing. Reassure the person and bystanders.

## IS IT A STROKE?

Check it out the F.A.S.T way!

### Face

Smile – is one side dropping.

### Arms

Raise both arms  
– is one side weak?

### Speech

Speak – unable to?  
Words jumbled,  
slurred.

### Time

Act fast and call 111.  
Time lost may mean  
brain lost.

# CALL 111 IMMEDIATELY IF YOU THINK IT'S A STROKE





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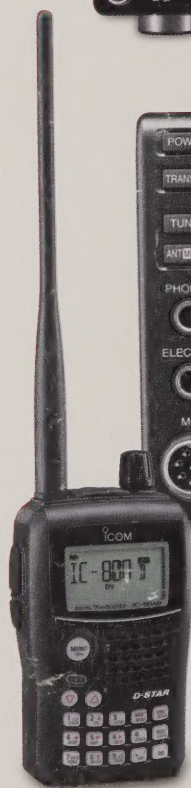
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